

A PREVIEW:
IBM'S PCjr
A REVIEW:
COLECO'S ADAM

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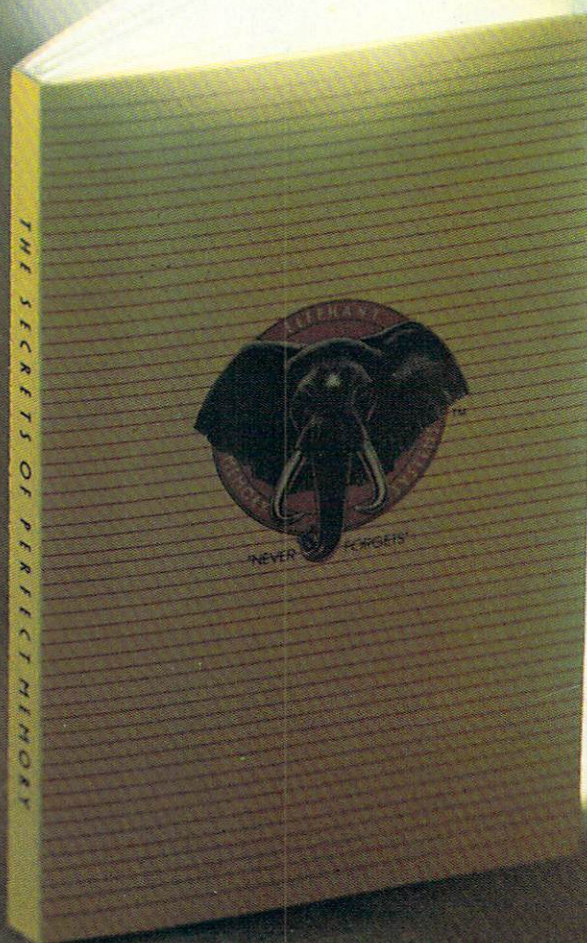
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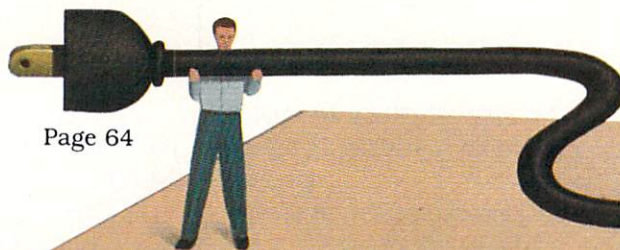
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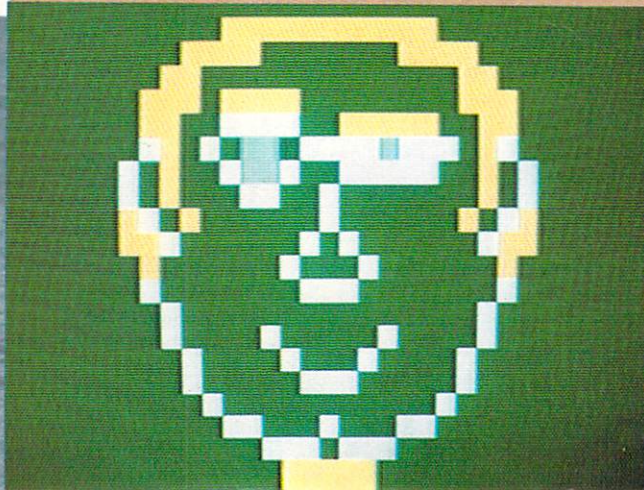
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About the Cover:
Our posed cover photograph illustrates the joys of computing, but it sets a poor example of proper computer care. A computer should not, of course, be used on a sandy beach, especially in the bright tropical sunlight. Disks should never be placed on a disk drive, and all food and drink should be kept away from the work area.

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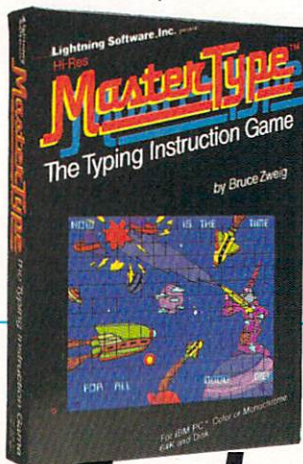
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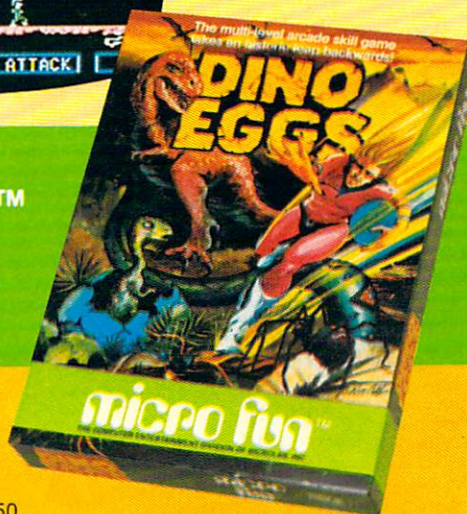
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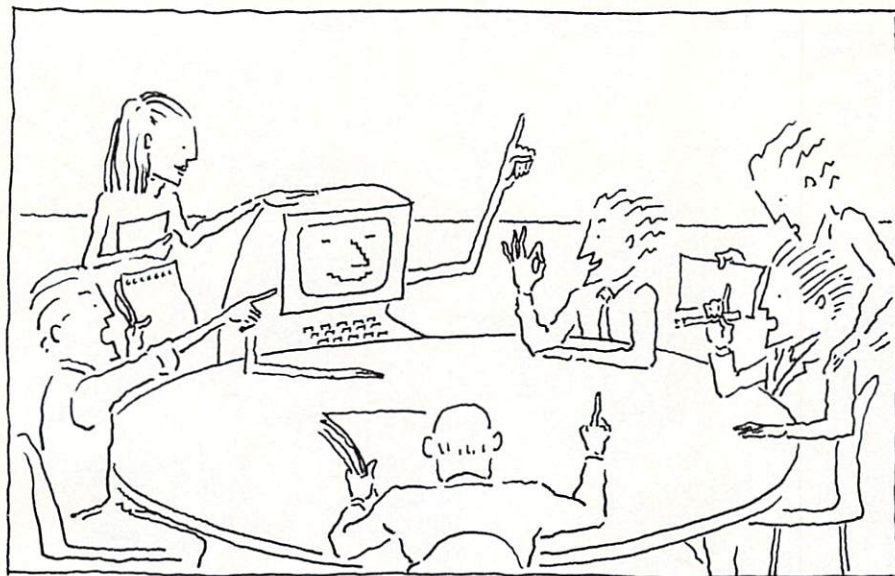


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EDITOR'S NOTE

COMPUTER BEHAVIOR— SOCIAL OR ANTISOCIAL?



Some people try to pin a rap on things they don't understand. Take the computer. Just about every day someone asks me, "Doesn't the computer tend to come between people? Doesn't it isolate them and lead to antisocial behavior?" And just about every day I see an example of the opposite.

Right in our own offices you can hear the "Shhhhhhs" directed at our computer lab, as our technical assistants yammer away. The people with the greatest degree of computer proficiency are the ones who talk the most, asking one another for help, showing off part of a program of which they're particularly proud.

For a lot of us starting out with computers, the need is different. Sure there are people who like to go off by themselves and master something alone. But most of the people I've seen want a friend around to comfort them, to hold their hand, to reassure them as they take each new step. And a little praise and some applause don't hurt, either.

This issue of FAMILY COMPUTING is rich in stories of people working together to get the most out of their computers, or brought together by a computer to get more out of some aspect of their lives. (If these stories remind you of your own experiences, please send them to us.)

If you're interested in reading about how people learn about and

with computers, you'll want to turn to Home-School Connection (p.23), which documents the "Computers Can" program that unites low-income Houston parents and their children in learning about computers; or to "Fun in the Sun" (p. 54), which describes the experiences of a mother and her son at a Club Med resort that included a computer facility. They relaxed and learned at the same time.

For a story about computers playing a significant role in people's lives, turn to "B-17 Reunion" (p. 76), which relates how a TS 1000 added a new dimension to a very special get-together of World War II veterans. For just some sheer fun with your friends and family, don't miss this month's programs, which start on p. 95. There's more, of course—our Buyers' Guide and reviews, along with more programs and articles that are designed to hold your hand or to cheer you on or just to make you laugh. And, of course, it's computers that bring us together. Don't forget that FAMILY COMPUTING is here to connect you to our other readers as well. We're eagerly awaiting your stories—they just might help someone.

Claudia Cohl

CLAUDIA COHL
EDITOR-IN-CHIEF

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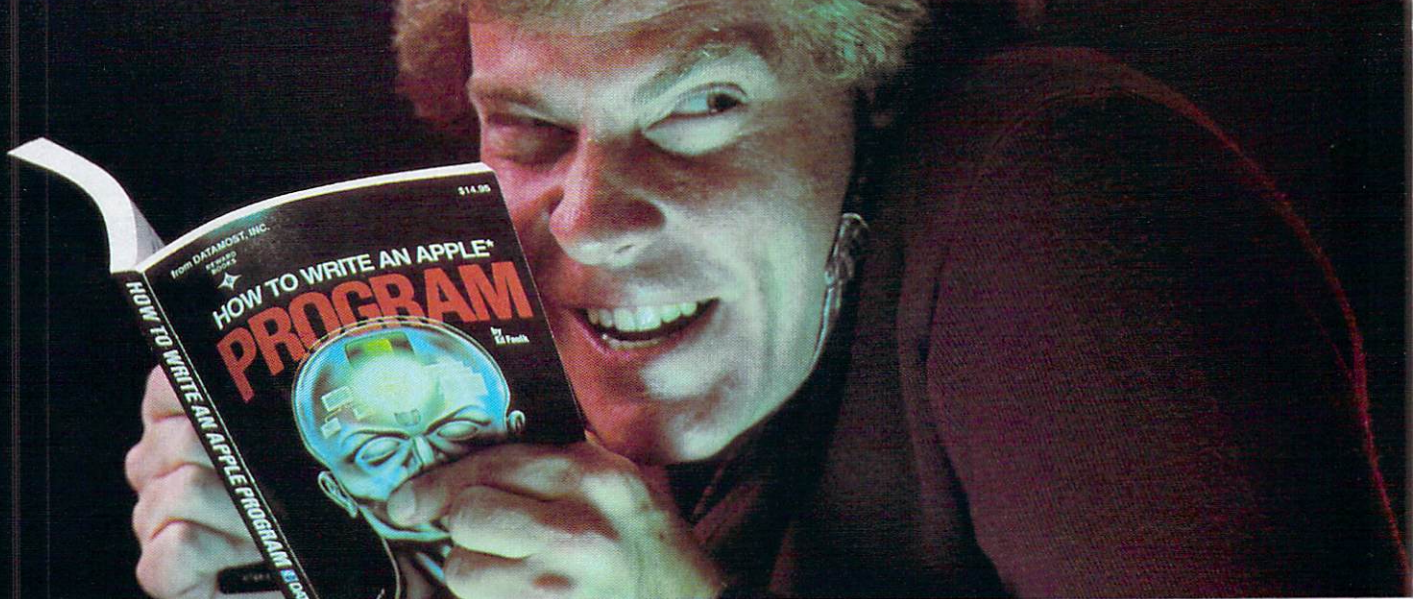
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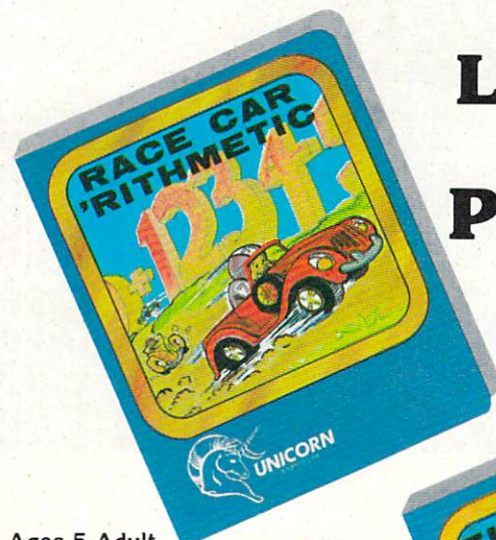
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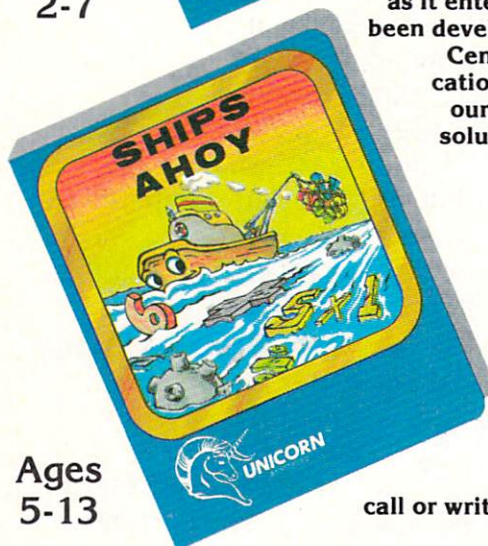
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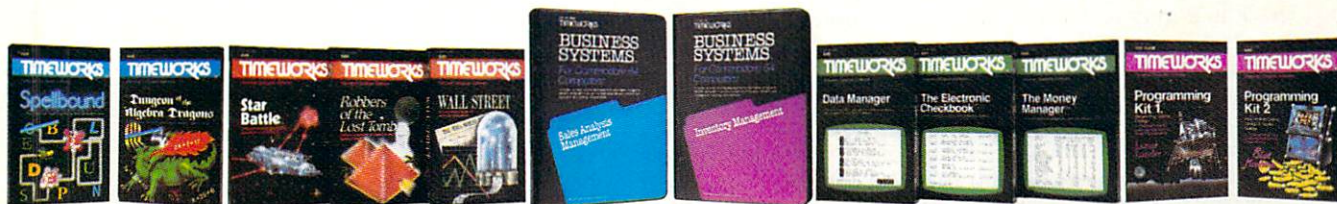
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LETTERS

COMPUTER USERS' FEAST

I've been waiting anxiously for my first issue of FAMILY COMPUTING, which I purchased through my children's school. Today, it arrived! I devoured it as a starving man at a banquet devours food. I was fulfilled!

Finally, a magazine I can understand—and I'm in my third year of college as a computer information systems major.

After an "electronic" computing magazine I could never understand, FAMILY COMPUTING is fantastic.

KATHY RUNK
Lancaster, PA

First let me congratulate you for a job well done. Your magazine, FAMILY COMPUTING, is a first. Most computing magazines on the stands are geared to one particular computer, or are just too technical for the beginning home computerist. I was very pleased with your first issue. From features to departments to overall layout, the magazine is a hit. It was the first computer magazine I've read cover to cover, and, needless to say, I've already entered my subscription.

WILLIAM LEAMING
Sierra Vista, AZ

A FAMILY AFFAIR

I just bought my first issue (October 1983) of your FAMILY COMPUTING magazine, and I especially wanted you to know what a great magazine it is!

Our family purchased an Atari 800 computer with a disk drive and printer last year, but has only been using it for some word processing and game playing. I am so excited to use the simple, but fun BASIC programs provided in your magazine. My eight-year-old daughter just loved the *Jack-O'-Lantern* beginner program—these programs have given us new confidence in using our computer more often.

Please keep up the good work! Finally, there is a magazine for all family members and with terms and language that we can easily understand. I hope you will provide some interesting programs concerning the home and household in the near future. I just ordered a subscription to your magazine and can hardly wait until the next issue.

MRS. DAVID R. HURLEY
Houston, TX

I recently made my usual quick scan of a local magazine rack, where I saw the Premier issue of FAMILY COMPUTING. I bought it, read it from cover to cover, and immediately decided to subscribe!

It is my pleasure to support a periodical whose goals parallel my own—that is, to put "the machine" to work for every member of the family. I look forward to future issues with enthusiastic anticipation.

JOAN E. SHERROUSE
Humble, TX

USER DEFENDS TI-99/4A

By this time you should have received a great deal of mail objecting to the very negatively biased comments concerning the TI-99/4A computer (Premier issue, p. 67)—I would like to add my concerns also.

The high use of negative words and phrases stood out in marked contrast to the comments made about the other computers, especially the VIC-20. For example, the VIC-20 has only a 5K memory vs. the TI-99/4A with 16K. The VIC has a 22-character line display vs. the TI's 32. The VIC has only eight colors vs. the TI's 16. The TI has a more sophisticated noise generator than the VIC.

To continue, the TI is noted as having seven negative features, generally with no remedy. The VIC, however, is noted as having two negative features with the comment "this should not matter much." The glaring bias is seen when TI is criticized for its 32-character display "not being good for word processing," whereas the VIC with its 22-character display is noted as "shorter than that of most competing models."

Furthermore, what is "unusual" about TI BASIC, when a comparison of the programs written for the various computers (e.g., *Rad Rhymer*) shows TI BASIC to be virtually the same as the others (practically speaking)? Why are oft-used characters said to require "fancy" typing, rather than simply saying that two fingers are required? Why are the TI BASICs said to be "somewhat complex" when my 15-year-old son and I have been using them with no complaint.

In conclusion, it would only be right for you to publish an apology for this analysis of the TI and pro-

vide your readers with an unbiased article that points out the truly outstanding virtues of this computer.

PHILIP J. PORTER
Leonard, MI

EDITOR'S NOTE: Mr. Porter's letter and several similar letters we have received from TI fans confirm at least part of what we said in the Premier issue's Computer Buyer's Guide: "The TI-99/4A elicits both strong positive and negative reactions from its users."

We began our reviews by listing the comparative specifications of each computer, including all those mentioned by Mr. Porter. We didn't recommend either the VIC-20 or the TI for word processing and, in fact, said that the VIC's text had a "stretched-out look" that can make large blocks hard to read. The TI's small keyboard requires "fancy typing" compared with a typewriter or standard computer keyboard. Because some oft-used characters are strangely placed, you can't type them without removing your hands from the "home" position, making touch typing nearly impossible.

TI's BASICs are "unusual and complex" because, as we noted in the review, they are "extremely powerful, allowing simple manipulation of graphics characters and animation." Other BASICs do not have the same kinds of graphics commands. However, though we mentioned TI's "sprite" graphics capabilities, we perhaps could have elaborated on that feature.

Our review included reports from users. We believe that it was fair and pointed out both good and bad features.

(For an update on the status of Texas Instruments, see *Behind the Screens*.)

CORRECTION

The price for *Delta Drawing* software, manufactured by Spinnaker Software, was incorrectly quoted in the October issue. The price is \$49.95.

FAMILY COMPUTING looks forward to letters from all our readers. Please direct your correspondence to: Letters to the Editor, FAMILY COMPUTING, 730 Broadway, New York, NY 10003. Include your name, address, and phone number. We reserve the right to edit your letters for length and clarity.

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BEHIND THE SCREENS

PEOPLE, NEWS, AND TRENDS

EDITED BY JOHN WALLACE

Price Wars

In the era that spawned *Star Wars* and *WarGames*, the latest headliner is "price wars"—a struggle between the major home computer manufacturers. It began in the spring of 1981 when Sinclair, a British company, dropped the prices of its ZX-81

(the parent of the inexpensive Timex Sinclair) to under \$100. The home computer marketplace is now a battlefield littered with chief executive officer casualties and red profit-and-loss statements.

Research conducted by the Yankee

Group, a leading industry analyst, shows the plummeting prices of popular personal computer consoles through October of 1983. Note the dramatic price drop in Texas Instruments' TI-99/4 and TI-99/4A. The company ceased production of its popular home model altogether when consistent losses forced it to disband its personal computer division in late October. Prices quoted in the chart below reflect the lowest amount the consumer could have paid for a given company's current line at any point in time.

The College Circuit

First there was the electronic hearth. Then there was the electronic cottage. Now, there's the Electronic University—the information age's counterpart to the all-American correspondence course. You won't find any sororities or pep rallies at the Electronic University. Students do all their coursework via a special modem-like telecommunications device, telephones, and their Commodore 64, Apple, or IBM personal computers.

The method of teaching and study is an updated version of the familiar correspondence course. Instead of relying on the mails, students and teachers communicate via messages left on an electronic bulletin board that can be referred to at the student's and professor's convenience. Professor and pupil can schedule "office hours" during which time the two can chat electronically. "It used to take three weeks or so to get a response in the conventional correspondence course, whereas with electronic study it takes a day or two," says Tom White, president of TeleLearning, the San Francisco-based company behind the project.

Courses are offered in the form of packages, consisting of the appropriate software and course material, available from institutions under contract with TeleLearning or directly from the company. The American Management Association, for instance, is offering business-management courses through the service. According to White, several universities have expressed interest in

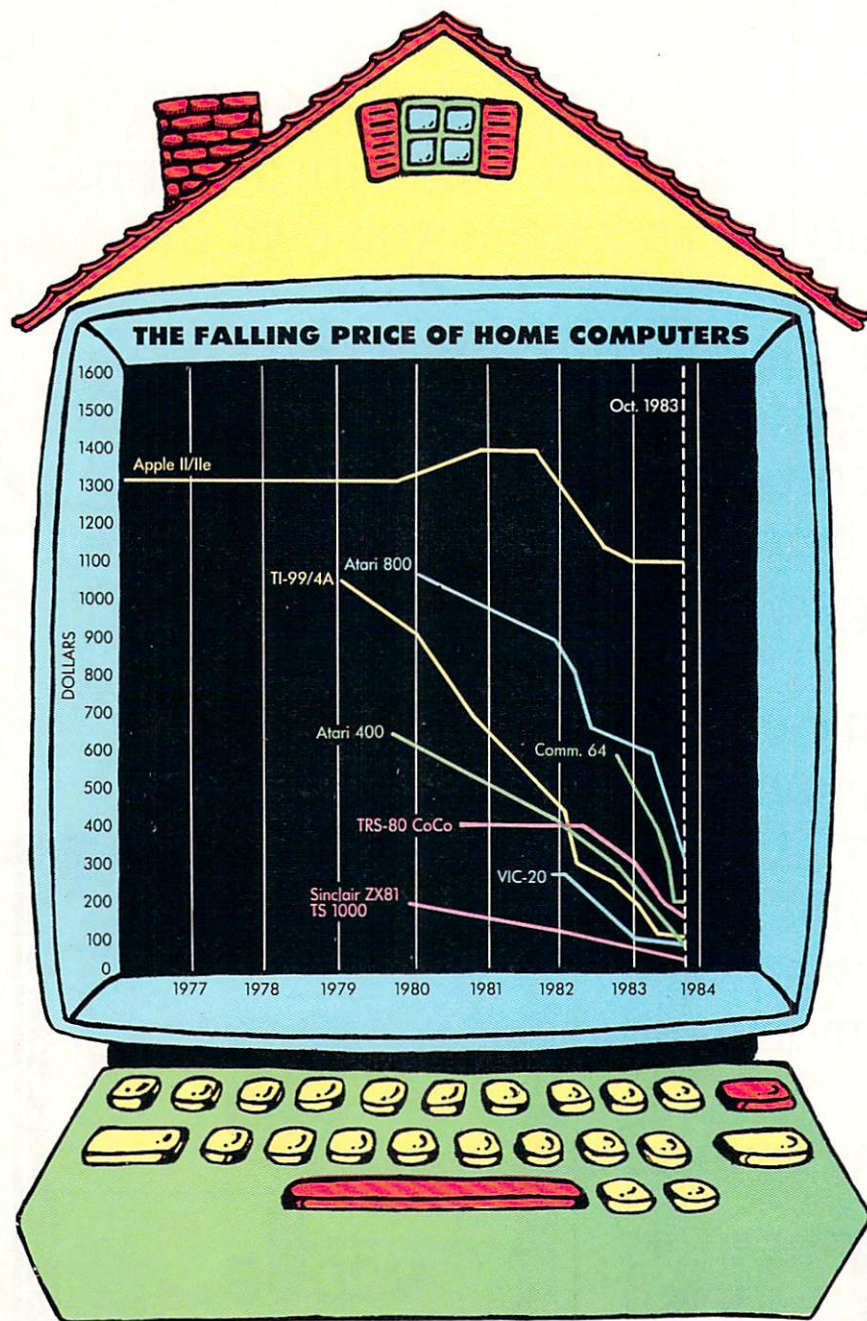


CHART AND STATISTICS SUPPLIED BY YANKEE GROUP

WHILE OTHER COMPUTER COMPANIES ARE BUSY SETTING NEW PRICES, SPECTRAVIDEO IS BUSY SETTING NEW STANDARDS.

MSX™ and LOGO™: Two more reasons why Spectravideo is leading the way in Personal Computers.

While price wars and confusion reign all around us, Spectravideo goes about its business, setting standards by which all other personal computers will soon be judged. MSX and LOGO are the two latest examples of how Spectravideo is rocking—and reshaping—the personal computer industry.

MSX AND LOGO.

It is now history that, on June 15 1983, Spectravideo, Inc. joined with most of Japan's largest electronics firms to launch MSX. The most far-reaching personal computer standard in history. MSX is the name given to a specific hardware/software configuration that makes product interchangeability possible. While Spectravideo is proud to participate in MSX, we are even prouder of this fact: It was our own SV-318 computer that was used as a prototype for the MSX design! There are two important aspects to this.

First, all future MSX hardware—i.e. computers, peripherals, appliances—will be based on several key design elements of the SV-318. What does this mean to you, the consumer? A great deal, because when you buy an SV-318, you will not only be able to use all of Spectravideo's own software and hardware—you'll also be able to take advantage of all the remarkable new equipment that will be coming from other MSX participants.

In addition, the software aspect of MSX was largely inspired by the software built into the SV-318. From the outset, Spectravideo offered built-in Microsoft BASIC as its resident interpreter. Now, Microsoft also makes a LOGO program compatible with the SV-318. It was Spectravideo's Microsoft BASIC/LOGO that helped to make MSX possible.

Another standard that Spectravideo can take credit for is the built-in Joystick/Cursor Control. Built right into the SV console, this control is always at fingertips and is much easier and faster to use than external joysticks or conventional editing controls.

Certain engineering elements that helped to make this built-in control possible have also been incorporated into MSX.

OTHER STANDARDS OF EXCELLENCE.

While these are the computer standardizations that Spectravideo helped to initiate, they by no means represent the whole SV-318 story. This remarkable computer has also established many standards of excellence that other personal computers now aspire to:

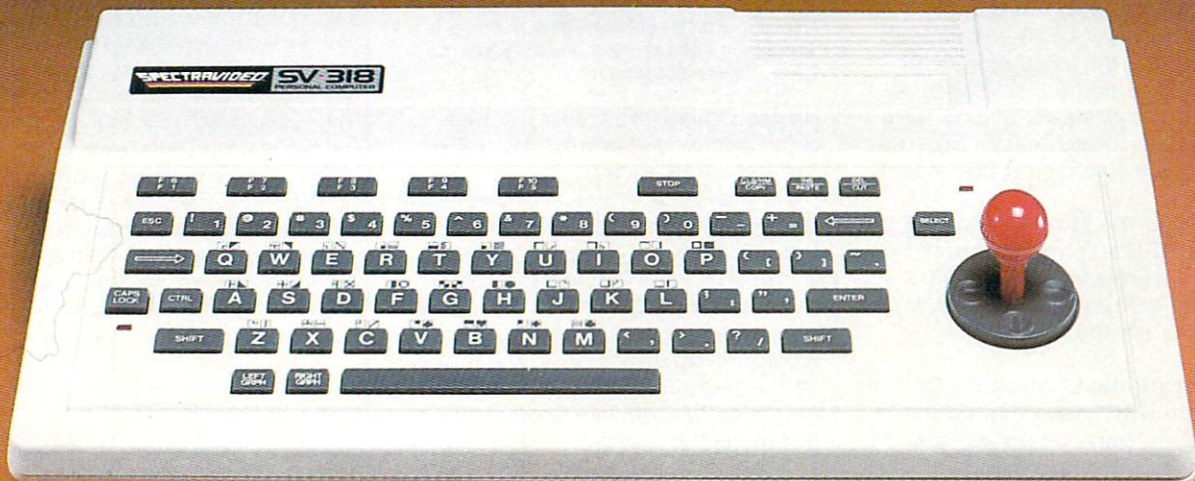
- **Built-In Super Extended Microsoft BASIC**—Makes the SV-318 the first truly programmable affordable computer!
- **Extraordinary Memory**—32K ROM expandable to 96K, and 32K RAM expandable (via bank switching) to an amazing 256K.
- **Unparalleled Expandability**—A full supporting system of 14 peripherals, including our new Colecovision™ Game Adapter, 7-Slot Expander Unit, Floppy Disk Drive, Data Cassette, Interface Cartridges, etc.
- **More Available Software**—Built-in CP/M compatibility gives you immediate access to over 3000 existing software programs. Plus, you can utilize Spectravideo's own fine software library.
- **Advanced Graphics Capabilities**—The SV-318 offers 16 colors in high resolution, and more importantly, 32 programmable sprites that allow tremendous control of movable screen objects.
- **Many other fine features**—Such as Z80A Microprocessor with fast (3.6) internal clock, top-loading cartridge slot, 10 user-programmable special function keys, 3 sound channels (8 octaves per channel!), low profile and attractive styling.

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BEHIND THE SCREENS

initiating some form of electronic study for off-campus students.

It's unlikely that electronic messages and modems will ever replace the time-honored tradition of higher education. But the Electronic University is sure to make it a lot more accessible to people who, for a variety of reasons, may have had trouble gaining access to the hallowed halls of academe. For instance, "Initial pilot projects were conducted with people from the Easter Seals program," reports White. "We taught computer literacy to homebound patients. It dramatically pointed out to us how people with some sort of physical impairment can have a new kind of education."

Computer Programming

There are almost as many books and magazines devoted to informing us about the information age as there are variations of *Pac-Man*. Now, TV shows have joined the other media in a crusade to educate us all about the applications, the ups and downs, and ins and outs of personal computing. PBS has taken the lead among the networks in the amount of computer programming featured. If all goes as planned this winter, viewers will be regaled with as many as five PBS television series dedicated to revealing the mysteries of the computer age.

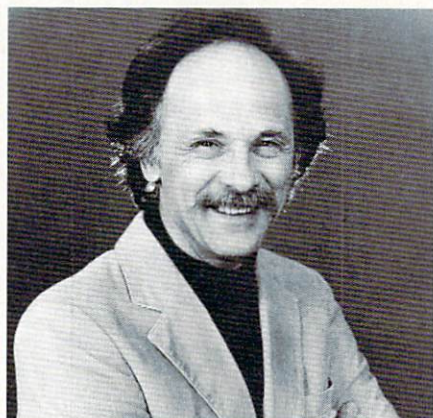
"Bits and Bytes," a half-hour show premiering the week of January 22 on PBS stations in 10 cities nationwide, features Canadian actress Luba Goy educating a lovable ignoramus played by actor Billy Van. Each week the show guides viewers a little deeper into the world of computing—beginning with the fundamentals and going on to more specific topics such as computer graphics and computer-assisted instruction.

The Canadian-produced "Bits and Bytes" joins a line-up on PBS which includes:

—"Making the Most of Micros," a sequel to BBC's "The Computer Programme," which focuses on programming techniques and the various uses of computers in our society.

—"Educational Computing Profile," a monthly "video newsletter" produced, in part, by the Educational Products Information Exchange (EPIE), a consumer advocate in the arena of educational spending.

—"The New Literacy," a televised



Explaining computers to TV Land are (from top to bottom): Isaac Asimov, a guest on *The New Literacy*; Nicholas Johnson, host of *The New Tech Times*, and Luba Goy and Billy Van, co-hosts of *Bits and Bytes*.

course explaining computer concepts and documenting the use of computers in society.

—"New Tech Times," a newsmagazine airing since last fall, hosted by former Federal Communications Commission and telecommunications columnist Nicholas Johnson. This show has a broader scope, dedicated to explaining in one package all the various elements of the dynamic technological currents working in society today.

"It's obvious that computers are the thing," explains PBS Director of Educational Programming Jon Cecil. "And it was clear that everyone—

educational folks and people in the business sector—was in need of more information on how to make a computer work."

Cecil says that input into the programming has come from a variety of sources. EPIE's "Educational Computing Profile," for instance, began as a project of Kentucky Educational Television. "They reviewed the software on the market and brought in qualified consultants. When they submitted the idea to us, we figured why waste all that expertise by just showing it to Kentucky?"

"It's a very hot topic. Even IBM has been poking its nose around about the idea of sponsoring a TV show." He admits that the shows are currently tailored to an audience with limited understanding of the revolution enveloping them. "The problem is that when you get higher than the introductory level, your audience starts dropping off."

A Micro Makes It Elementary

Traditional tools of the crime-crackers' trade—undercover operations, finger-print files, mugshots—may soon be joined by the microcomputer and appropriate software. The San Jose Police Department used an Apple III in an eight-month sting operation that ended last spring with the recovery of \$1.5 million in drugs and stolen goods, and the arrest of 45 suspects.

Carolyn Wall, an SJPD secretary, had relied on regular old file cards to organize the paperwork in a previous investigation. She said the paperwork nearly drowned her, so she switched to a computer. Officers working undercover at a bar "front" called Russ and Rosie's gave Wall information that she could file and update easily with *PFS: File*, donated by Software Publishing. She used *PFS: Report* to print out the data with which the agents recognized and apprehended suspects. A tough crime to crack—but thanks to Wall's applications know-how, a computer, and good software, it was elementary!

—LINDA WILLIAMS

If you've got a good bite-sized piece of computer-related news involving people, trends, or innovations, let's hear it. We will pay \$25 for each item we publish. Write to Behind the Screens, c/o FAMILY COMPUTING, 730 Broadway, New York, NY 10003.

The END of DINKETY-DINK-DINK.

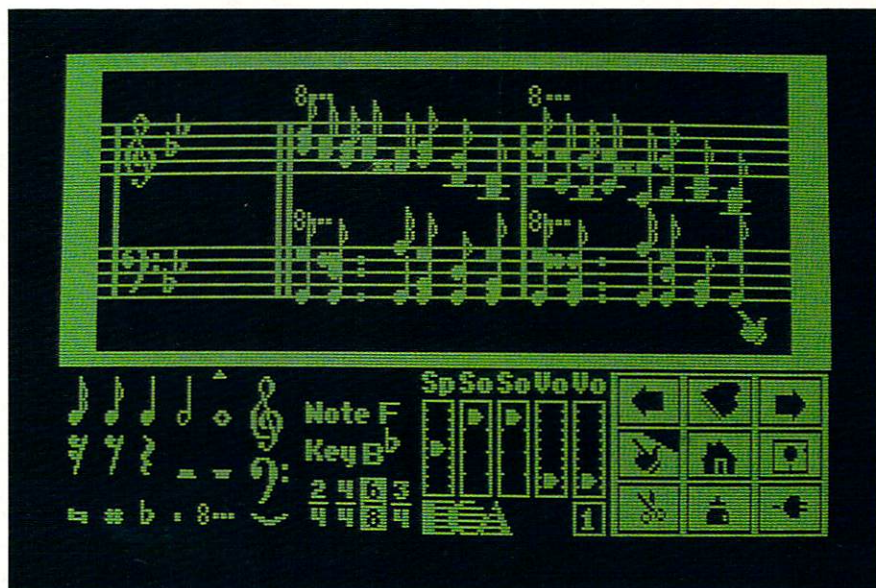
Announcing the first computer music program that actually sounds like music.

LET'S FACE IT. Up till now, music programs for your home computer have all sounded, well, pretty lame. There were the ones that resembled little electronic music boxes, remember? And then there were those that sounded like so many burps.

Enter Music Construction Set.™ It's the first music program that really makes use of the power of that machine you've got. If you're a serious student, this means you'll be able to work with an intricacy and range of sound quality you've never heard before on a computer. And if you know nothing about music, you'll find something even more important. Namely, that this thing is simple enough to be a lot of fun.

Take a good look at this screen because it, you, and a joystick are the whole story here.

That's you at the right end of the staff of notes — the little hand. Move the joystick, and you move the hand. Use it to carry notes up to the staff. Lay in rests, signatures, clefs, then point



to the little piano in the lower right and listen, because you'll hear the whole thing played back.

Move those little scales in the middle up and down to vary the music's speed, sound quality, and volume. Use

the scissors to cut out whole measures, then use the glue pot to paste them in somewhere else. Got a printer? Great. Print the score out and show it off to your friends.

But what if you're not up to writing your own stuff yet? No problem. There are twelve pieces of music already in here, from rock 'n roll to baroque. They're fun to listen to, and even more fun to change. (Apologies to Mozart.)

The point is, the possibilities are endless. But if you're still skeptical, visit your nearest Electronic Arts dealer and do the one thing guaranteed to send you home with a Music Construction Set in tow.

Boot one up. Point to the piano. And listen.



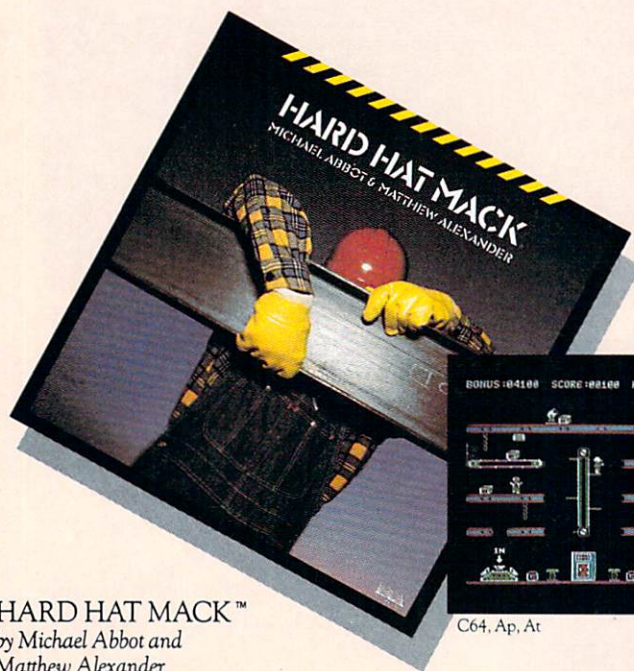
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MUSIC CONSTRUCTION SET is now available for Apple II, II+, IIe, and Commodore 64 computers. The Apple version, with a Mockingboard,™ plays chords of up to six notes each. The Commodore version plays chords of up to three notes each. Apple is a registered trademark of Apple Computer. Commodore is a registered trademark of Commodore Business Machines, Inc. For more information about Electronic Arts, write us at 2755 Campus Drive, San Mateo, CA 94403 or call (415) 571-7171.

"Make note of that name, Electronic Arts. It may well set the standard for sophisticated entertainment software in the '80's."

—Creative Computing.

ELECTRONIC ARTS COMES TO THE COMMODORE.



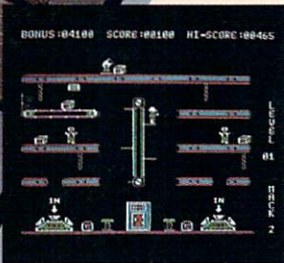
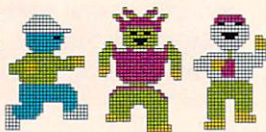
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by Michael Abbot and
Matthew Alexander

"An outstanding, state-of-the-art game. Hard Hat Mack is the blue collar hero of this three screen climbing game and his tasks are far from simple."

—Arcade Express

"If you put Hard Hat Mack in the ring with all other games on the market, it would win most bouts in the opening seconds of the first round. It's that good."

—Softalk



C64, Ap, At



ARCHON™

by Free Fall Associates

"No review could possibly do more than hint at the manifold excellence of Archon. It is truly a landmark in the development of computerized strategy games."

—Video

"...you're bound to fall for it. Imagine a chess game in which you can cast spells."

—Creative Computing

"...the offices of A.N.A.L.O.G. echo with the searing roar of dragon-fire and shouted obscenities from angry players. Archon turns friend against friend and inspires grudges that can last for days. What better compliment can you give to a computer program."

—A.N.A.L.O.G.



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M.U.L.E.[™]
by Ozark Softscape
"A must-have."



—Electronic Fun

"May well become the Monopoly of computer games."

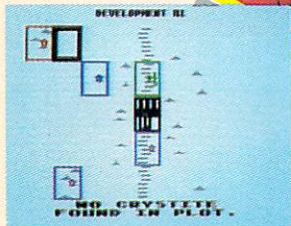
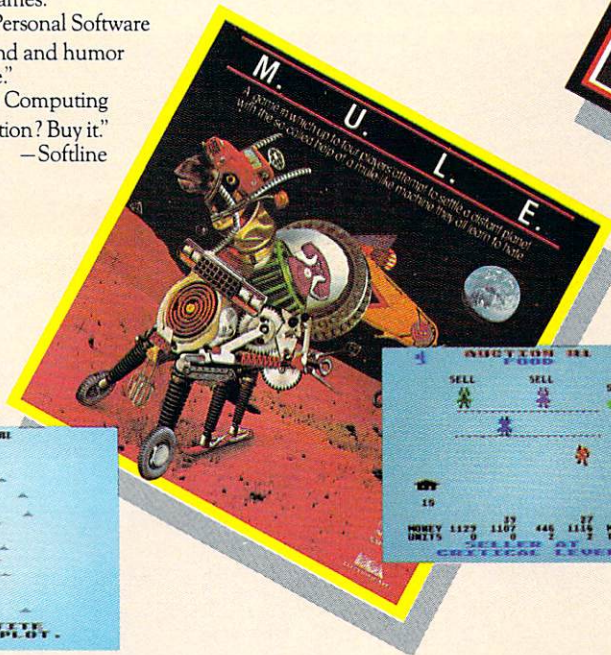
—Personal Software

"Graphics, sound and humor are superlative."

—Creative Computing

"Recommendation? Buy it!"

—Softline



C64, At

MURDER ON THE
ZINDERNEUF[™]
by Free Fall Associates
"Whodunit fans, drop your Agatha Christie and come running. This is your game! The graphics are among the most colorful and attractive I have seen in any game." —Antic



C64, At



PINBALL
CONSTRUCTION SET[™]
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"The best program ever written for an 8-bit machine."

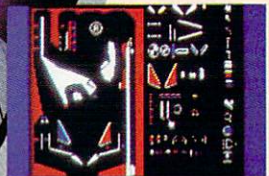
—Steve Wozniak

"A fully integrated graphics-oriented design tool that lets you create your own video pinball games, required study for all serious software authors."

—A.N.A.L.O.G.

"A tour de force."

—Creative Computing



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SOFTWARE ARTISTS?

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Enter Larry Bird and Julius Erving Bird — the hustler, the strong man, deadly from outside. Erving — The Doctor, maybe the most explosive player in the history of the game.

We talked to them, photographed them in action, studied their moves and their stats and their styles. Then we set out to create on computer disc an event which may never happen in real life. We put the two of them together on a dream court of light, for an electronic afternoon of one-on-one.

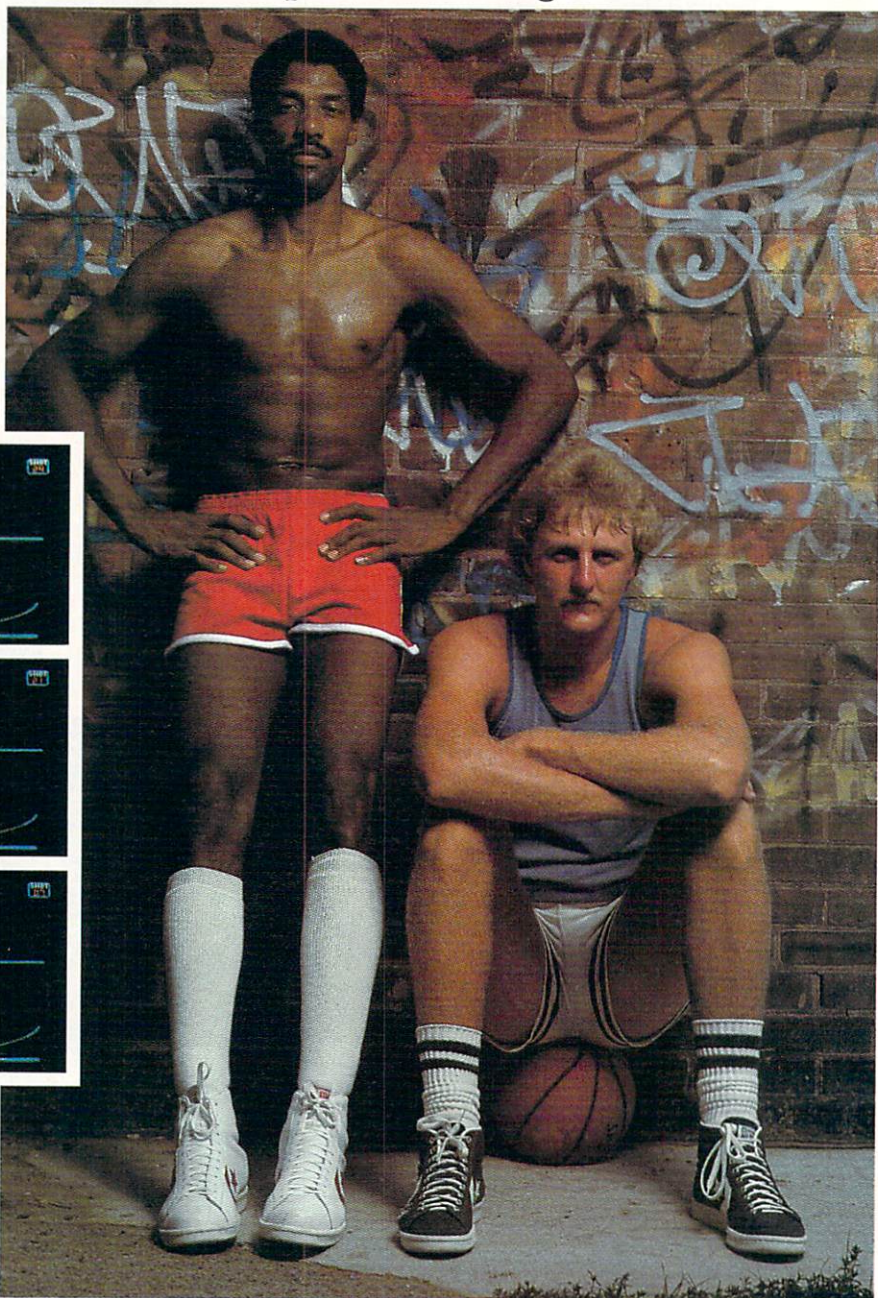
It wasn't easy. When they talked, we listened. When they criticized, we made big changes. When they gave suggestions, we took them.

And it shows. This thing is absolutely uncanny. You actually take on all the skills and characteristics of Bird or The Doctor — their own particular moves, shooting abilities, even strength and speed.

You'll meet with fatigue factors, hot and cold streaks, turn-around jump shots, and 360-degree slam dunks. But there's some whimsy in here, too — a funny referee, a shattering backboard, even instant replay.

It's called *Julius Erving and Larry Bird Go One-on-One*.™ You're Bird. Or you're The Doctor. And that's the last decision you'll have plenty of time to make.

How we got this year's hottest sports game out of two rather inexperienced designers.



Julius Erving and Larry Bird Go One-on-One is now available on diskette for Apple II, II+, and IIe computers. Apple is a registered trademark of Apple Computer. To find out more about Electronic Arts and its products, write us at 2755 Campus Drive, San Mateo, CA 94403 or call (415) 571-7171.



HOME-SCHOOL CONNECTION

IN HOUSTON'S "COMPUTERS CAN" PROGRAM, PARENTS AND CHILDREN LEARN TOGETHER

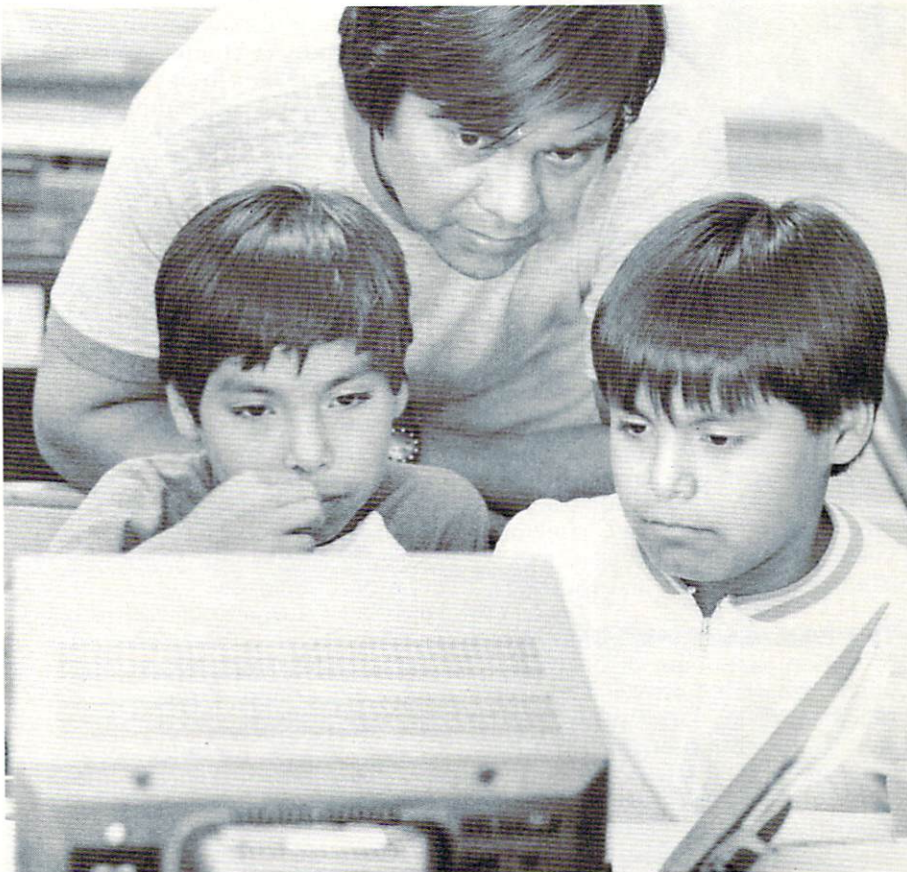
BY KAREL HOLLOWAY

The parents walk into the room quietly and sit down at the chairs in front of the machines. They inch back nervously. Then, after a little coaxing from the instructor, they tentatively strike the first key. Within minutes they begin to laugh and talk with their children, pointing at the screen, trying new things on the keyboard. The students—parents and their children—have had their first lesson in computers and moved a step closer to a better education.

The low-income parents have volunteered to take 12 hours of computer instruction through the Houston, Texas, school district's "Computers Can" program. After the parents complete the training they can check out a Texas Instruments 99/4A computer and educational programs for two weeks use in their own homes.

"I really liked seeing my kids in the house working on something that does something good for them," said Graciela Saldana, who took the training to help her three children. She said her 8-year-old son, Santiago, particularly improved his math skills using the computer. And Mrs. Saldana said she was pleased because she had learned a way to help her children do better in school.

In fact, all but one of the parents who responded to a questionnaire from the district said they were very pleased with the course and the program. The one parent who responded negatively said he wanted his children to learn basic reading and math concepts on their own before using a computer.



Enrique Luna and his two sons tackle the computer during an after-school study program.

NEW HOME-SCHOOL LINKS

School district officials said they were pleased with the course because it increased parent interest in their children and their school. "You see a lot of new faces in the classes," training director Nancy Kimbrough said. "There is a lot of pressure from the kids for their parents to come. They go home and say, 'If you don't come, I can't have this. Johnny has this.'"

According to Patricia Sturdivant, Houston associate superintendent for technology, the program has a number of objectives: getting the parents into the schools and working with their children at home, as well as emphasizing the advantages of computer education. Dr. Sturdivant

said with obvious delight, "We've had an astonishing amount of success. We are instilling motivation in the kids as well as the parents. We have very little participation in our parent-teacher organizations, but we've got a waiting list of parents for this program."

Ms. Kimbrough added, "We have parents calling us all the time asking 'What is the program? When can we get it for our school?'"

The program began as an experiment in two elementary schools last year and will be implemented in 45 elementary schools this year. Each school will be provided with 20 computers and a variety of game-like programs designed to teach mathematics, reading, and problem solv-

KAREL HOLLOWAY is a reporter for The Dallas Morning News. She's written a number of articles about computers and education.

PHOTOGRAPHS BY HOWARD LINDSAY

HOME-SCHOOL CONNECTION

ing. The most recent series of training sessions for parents began in late October, during which the district hopes to train as many as 200 parents in each school.



Max Bisor instructs her students.

All of the schools involved in the program are in low-income neighborhoods and have mostly black and Hispanic students. The \$1 million cost of the "Computers Can" program was covered by federal funds.

THE FAIL-SAFE PROGRAM

"This is part of our districtwide push for parental involvement—called Fail-Safe," Dr. Sturdivant said. "We always thought that the evolution of Fail-Safe would bring us into closer and closer communication with our parents. What we really wanted to get at was the home. We thought the computer could be a catalyst between parents and children. The computer seemed to be the optimum communication tool. We began conceptualizing the idea about two-and-a-half years ago."

After classes it isn't easy to get parents to leave. "We have to tell them to turn the computers off or [we] just turn the electricity off," said Robert Eicholz, training coordinator for the department. By the second day of training, the same parents who were nervous about touching the machine the first day show up early for class to have extra time on the computers.

"The parents come in earlier and earlier every day. At least 50 percent of the families don't want to take the break [scheduled in the middle of the two-hour sessions]," Eicholz

said. "Now these are people who don't know anything about computers. Some of them have never seen a keyboard, even a typewriter keyboard. Many of them don't have phones. This is really something for them."

Often three and four children, including some infants, come to afternoon sessions with parents. Eicholz noted, "With 20 computers with their music, and parents and children, it gets real noisy."

Dr. Sturdivant said the attendance of the younger children has been an unexpected benefit of "Computers Can." "We are really impacting all those children at home. And children as young as three and four can benefit from these software programs," she said.

After the final session the parents are eager to take the computers home. They line up to check out the small computers, speech synthesizers, and color monitors. In a system much like a library, parents sign small checkout cards before they bundle up the equipment and carry it off.

PARENT EDUCATION—BASIC SKILLS PLUS . . .

Parents are learning as well as their children. "A lot of the parents at my schools are dropouts or didn't go to school. They feel inadequate in that way," said Louise Cantu, a teacher at De Zavala Elementary School, where 99 percent of the students are Hispanic.

Ms. Cantu said she taught the

HOUSTON'S DEPARTMENT OF TECHNOLOGY—PREPARING TOMORROW'S SCHOOLS TODAY

The classroom of the future will be a classroom full of technology—computers, hand-held learning machines, and video machines.

The Houston school district is preparing its teachers and students for that future with an entire department devoted to the technology of today and tomorrow.

The Department of Technology, which opened in December 1981, plans to have all 188,000 students in the district working on a computer within the next three years. "Our goal is to have four microcomputers in each school," said training director Nancy Kimbrough. "We already have some [schools] that meet that goal and are working on the others."

The department, with 32 staff members, is housed in an old elementary school that the district closed after enrollment dropped. The green-carpeted offices include a training laboratory where Apple computers line the walls. There is a library crammed with computer books, magazines, and programs for the use of teachers throughout the district. In another computer-filled room evaluators and teachers can preview software that is being considered for school use. A model classroom shows teachers how to set up their work areas to make use of technology.

The district even has created a new position, teacher technologist, to help teachers make use of computers and other technological equipment in their classrooms.

A slide presentation produced by the department to explain its function explains, "The district is preparing children for the computer-based world they will inherit. The Houston school district is so committed to the concept that computer literacy is taught as a formal course."

The technology department also has found ways to use computers to help parents understand how their children are doing in school. In one program designed to help teachers communicate student progress, parents receive computer printouts showing test scores and areas where the student needs additional help.

Within two years the district hopes to set up an elementary, junior high, and high school devoted to technology. "They will use computers and hand-held devices like those that teach spelling, and will take advantage of cable and satellite television technology," said Robert Eicholz, the department's training coordinator.

The department already is training 300 teachers a month in computer use and instruction to prepare for the arrival of computers in the classroom. Technology Department staff members spend their days in front of their computers working on plans and programs for classroom teachers. They are perfectly at home with all their machines. "You'd expect them to be," Associate Superintendent for Technology Patricia Sturdivant observed. "After all, this is the Department of Technology."—K.H.



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HOME-SCHOOL CONNECTION

classes in both English and Spanish. Some of the parents can't read the English instructions that appear on the computer monitor and depend on her explanations. Ms. Cantu said, "I tell them what is going to happen and they can catch on to what to do next. And, the children have some English capability and they can translate for the parents." Eicholz added, "In some cases, we are teaching the parents basic skills."


The program was started in the low-income schools that teach predominantly minority students because the district is most concerned about those children being left behind in the computer age. "Let's face it," Ms. Kimbrough said, "we've got a lot of parents in this school district who can go out and spend \$2,000 on a home computer and not think anything of it. This program addresses the question of equity."

Dr. Sturdivant agreed: "We really have a huge risk if we can't train these low-income students to compete. The equity issue is very important to us since we are in a large urban school district."

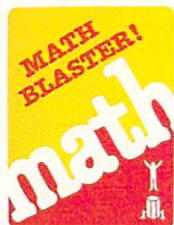
PARENT-STUDENT COOPERATION

Improving the learning skills of the poorer students also is a concern. Dr. Sturdivant said, "We've seen school districts spend millions of dollars on remedial programs that haven't worked." This program is an attempt at remedial education that the district believes will work.

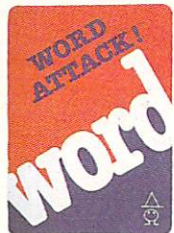
While no testing was done during the pilot to determine how much the students had learned, instructors did ask the parents how much time they were spending helping the students at home. The study showed an overall increase in the time and number of days a week the parents helped at home. The number of parents who said they tutored their children for three or more hours each day rose from four to 30; the number who said they worked with their children for two to two-and-a-half hours each day went from six to 12; and the number of parents who tutored their children five or more days a week rose from 29 to 37.

"The kids were more motivated. Their attitude about school was better," said Ms. Cantu of the students in her classes who used the computers at home. "In every case, they never faltered in doing their homework and using the computer." 

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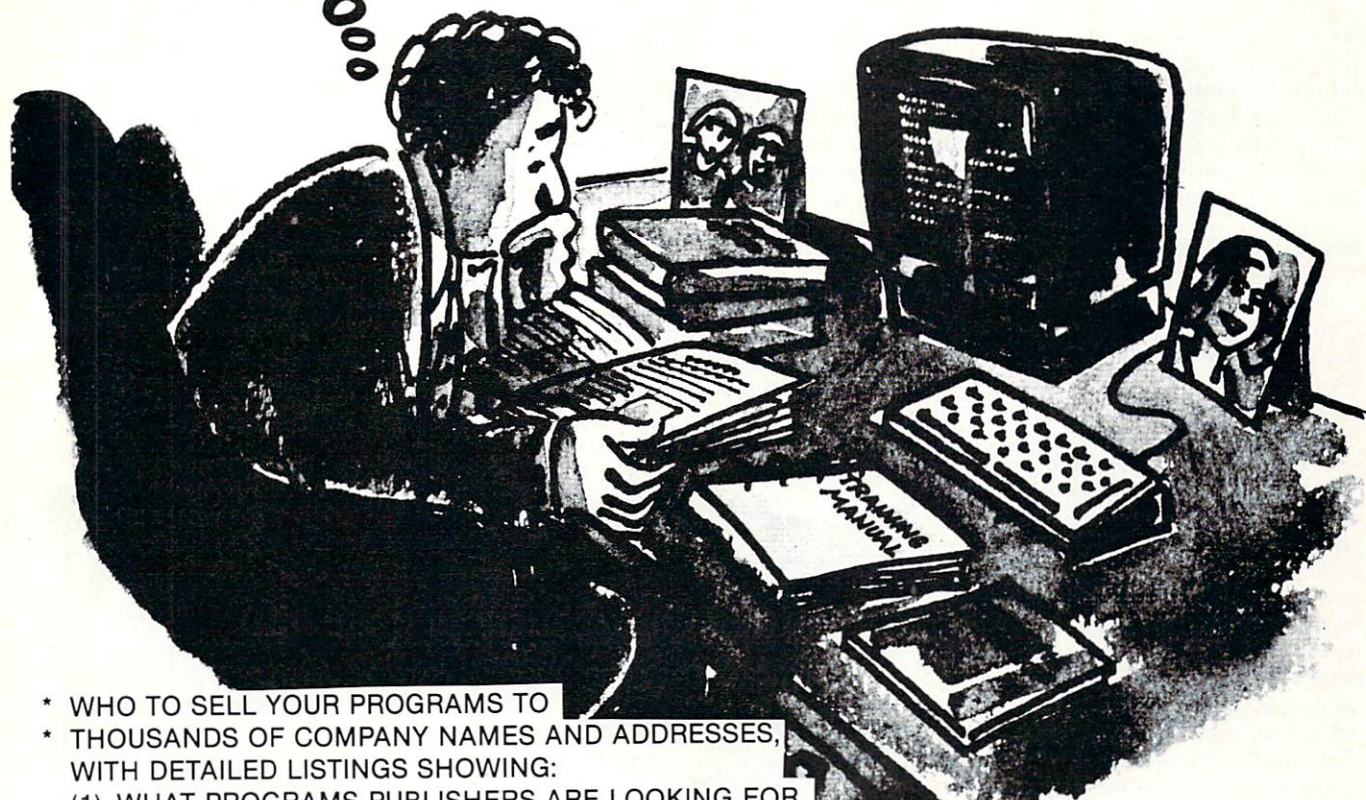
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GAMES

A FEW OF MY FAVORITE THINGS . . .

BY JAMES DELSON

I spend 300 hours a month playing (or watching others play) as many as 60 different computer games. Some are discarded as *Space Invaders*, *Pac-Man*, *Donkey Kong*, or *Defender* clones. Others fail because their graphics, play systems, or general design are substandard or outdated. Some are just plain boring. I look for games that are advances in the field, original in concept—games that my play testers can't get enough of.

Of the hundreds of games I've played, only a few deserve special recognition. The ones listed here have been selected because they signify major contributions to this rapidly expanding entertainment form of personal computer gaming. Each is either already a classic or is fast on its way to achieving that status.

My Overall Favorite:

WIZARDRY, Sir-tech

Wizardry and its sequel, *Knight of Diamonds*, are the kind of role-playing adventure games I savor. And Sir-tech's series of programs is unsurpassed. Players always come back for more, becoming increasingly involved with each new level they reach. The play system is simple and exciting, almost unique in the way you can build and modify your characters. Initially, you create one character or set of characters. By carefully guiding them in and out of danger in the multileveled mazes that comprise the playing fields of the two scenarios, you help your heroes develop from novices into experts in their fields. Choose from a cast of colorful "races": gnomes, hobbits, dwarves, elves, and humans. Select "professions" such as thief, mage (wizard), priest, and fighter, graduating to more advanced ninjas, samurais, bishops, and lords.

Wizardry players tend to get very attached to their characters. It's not unusual to hear an enthusiast referring to them as if they really existed. *Wizardry* and *Knight of Diamonds* are my favorites because they offer you an extraordinary opportunity—

it's as if you're practically entering your computer, experiencing adventures right alongside your heroes. (The *Wizardry* series is available for the Apple only. But hopefully the popularity of this breed will promote versions for other machines.)

Strategy/Shoot-'em-up:

BROADSIDES, Strategic Simulations

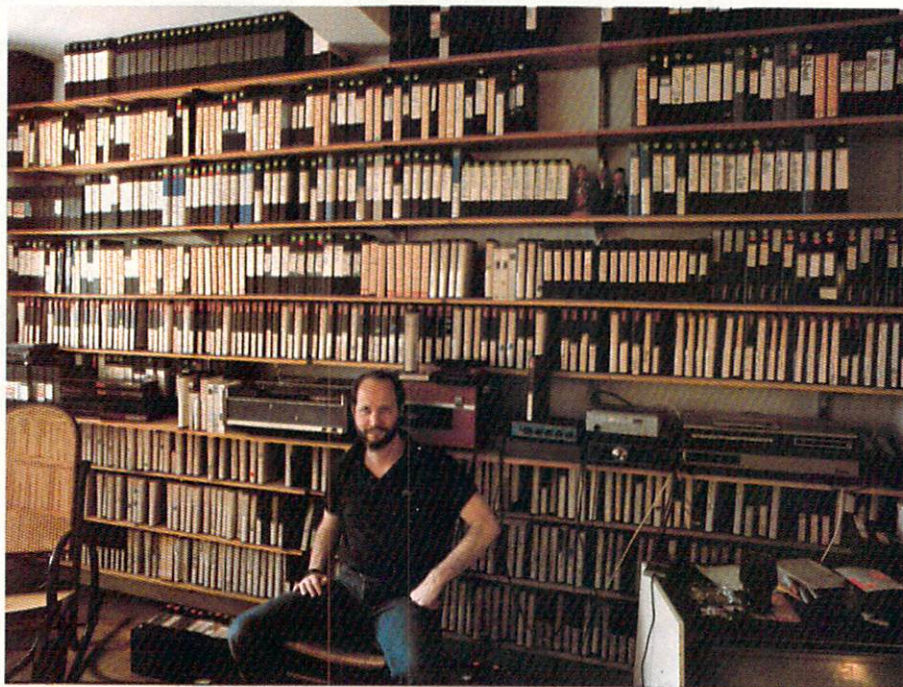
Using 18th- or 19th-century warships built by you or furnished by the computer, you set sail on the screen to sink your human or computerized opponent. It's complex when you first embark, but once you've got the rules under your belt, you can tactically maneuver your ship around the board—using the wind to propel you forward, changing direction to cut off or get away from your opponent, loading your guns with three different types of shot to be fired at the enemy's hull or sails. There's even a subprogram included for hand-to-hand combat when one ship comes alongside another. Animated sword fighters duel at the bottom of the screen, using five different kinds of action. (This

addictive game is currently available for the Apple only.)

Hybrid:

ARCHON, Electronic Arts

The hybrids I'm talking about are not fancy roses or crossbreeds of rare plants, although *Archon* may indeed classify as the exotic orchid of computer games. Combining the strategy elements of chess with a multiplayer, multicharacter arcade shooting system, this is one of the earliest and most stunning in a genre that could well be the next trend in gaming software. Pieces don't merely move across the computerized game board. When two opponents land on the same square, the screen shifts from board to battlefield, with foes shooting, dueling with hand weapons, or using magical powers to win the round. Players square off against either the computer or mortal opponents, employing basic, shoot-'em-up skills as well as the kind of cunning required for victory in a chess match. (Currently available for the Atari and the Commodore 64, similar versions should

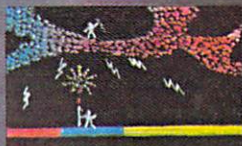


FAMILY COMPUTING games connoisseur, James Delson, at home in his library.

JAMES DELSON is FAMILY COMPUTING's games critic.

AARDVARK *Action Software*

PRESENTS...



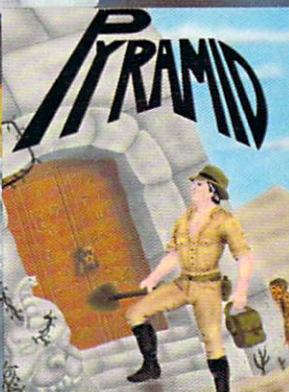
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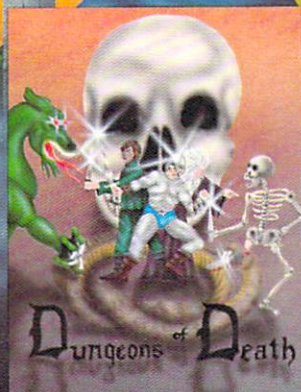
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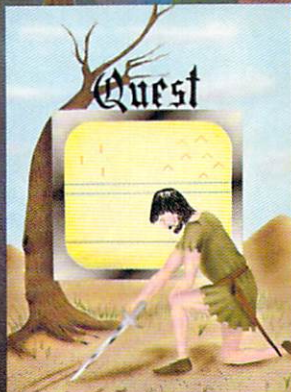
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Quest is also available on TRS-80C as a 32K extra memory, extra fun adventure. It's a little more difficult, and will test the most experienced explorer of the kingdom.

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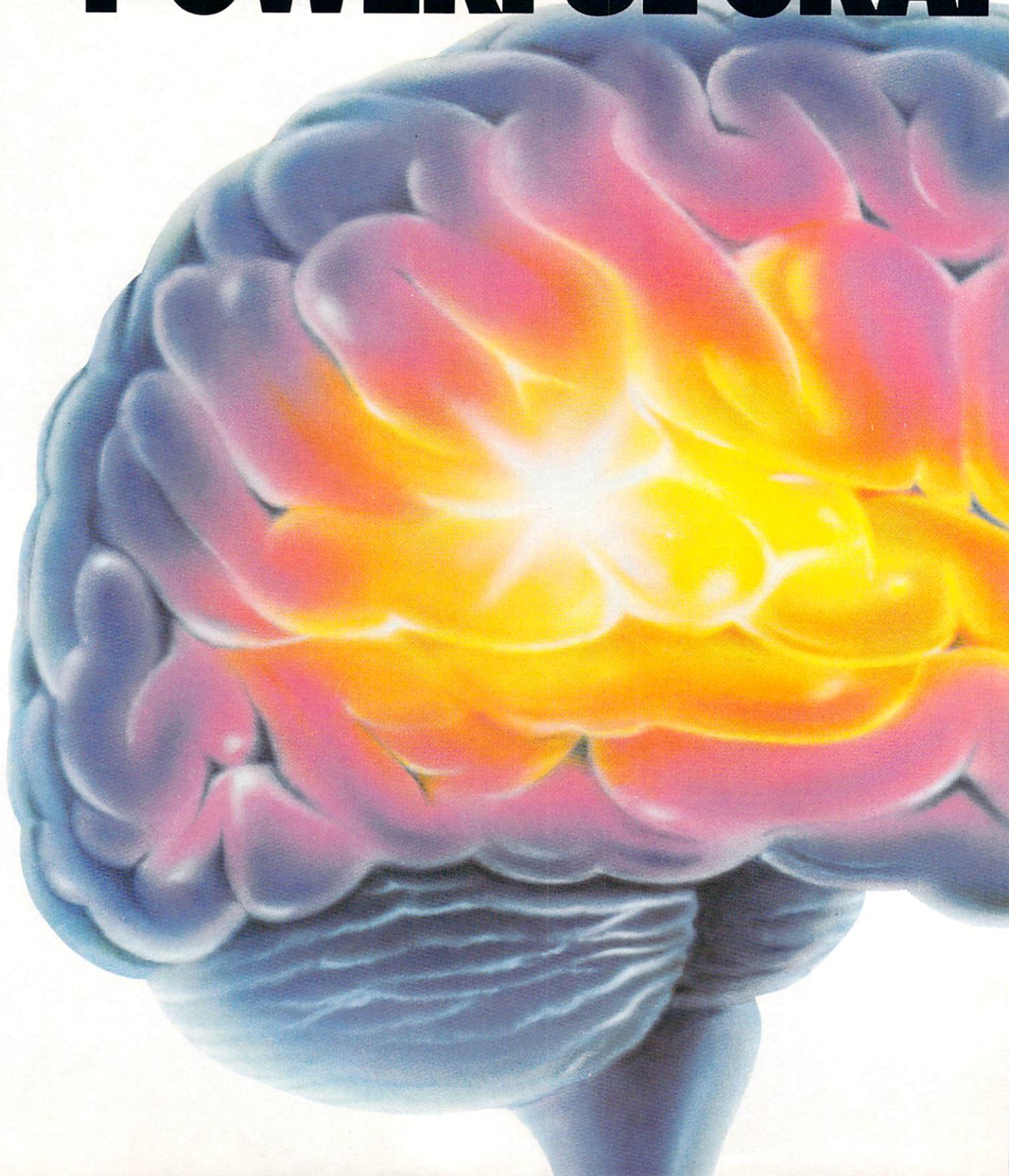
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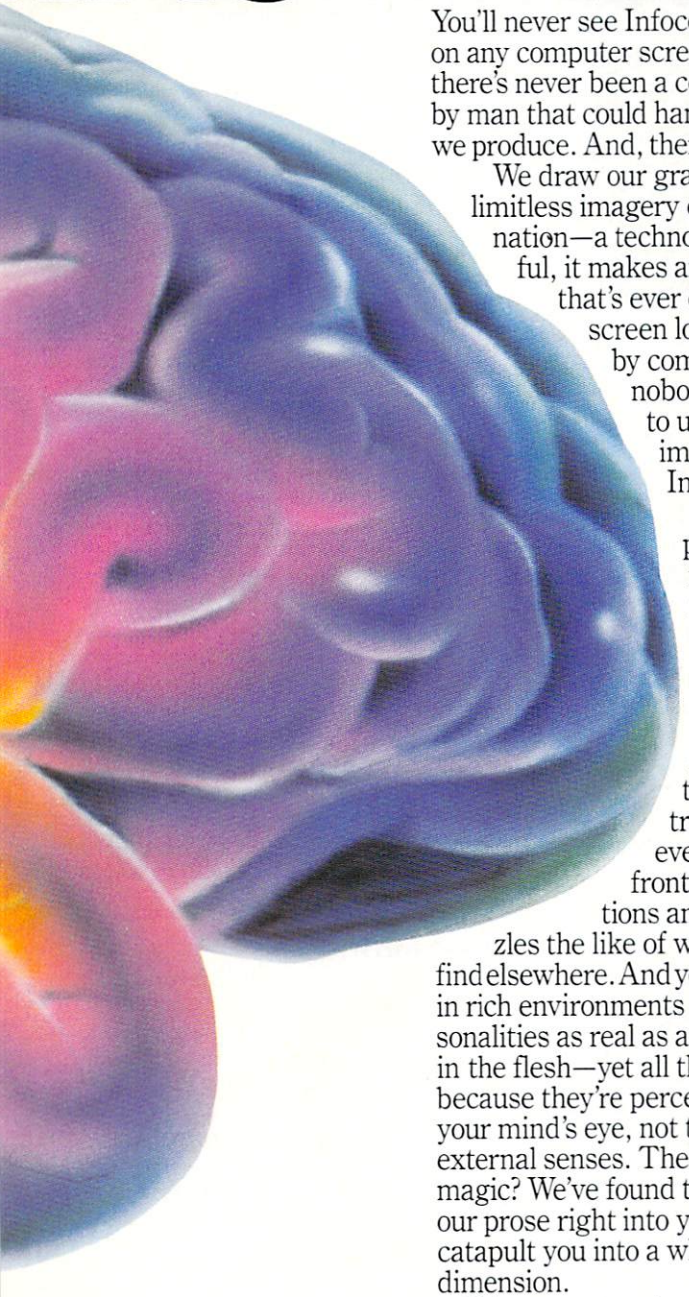
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GAMES



Shown clockwise from top left are: *Flight Simulator*, *Pinball Construction Set*, *Archon*, and *River Raid*.

be coming out soon, they say, for the Apple and IBM PC.)

Sports Game:

MICROSOFT DECATHALON, Microsoft

For those who've dreamt of being sports stars or who merely enjoy the tension of sporting events, computerized sports games offer sweat-free excitement for enthusiasts seated in the stadiums of their own living rooms. All 10 contests of the Olympic event are included in this package, an especially strong feature of which is that as many as six players can participate in the competition. "Run" with your fingers rapidly typing the keys; "leap" hurdles, high and long jumps; "throw" the javelin, discus, and shot put; and even perform the complex pole vault (a challenge that requires six separate functions on each attempt). An animated athlete performs according to your commands. If you train well enough, you may see your character win the gold medal. (The version for the IBM PC has a less sophisticated counterpart for the Apple.)

Arcade Action:

RIVER RAID, Activision

An arcade home computer game is the kind of game for which you'd expect to slot quarters at the local pizza parlor. They're simple to learn, understandable by just about anybody, and need virtually no documentation. The best I've encountered this year is *River Raid*, one of the latest from the famous makers of home video cartridges. Revised and expanded from its earlier incarnation

as a home video cartridge, *River Raid* has proven to be consistently entertaining and downright addictive for anyone old enough to grasp its straightforward premise. Players must fly an attack jet up an endless river, destroying enemy installations, vehicles, and bridges. The game's only drawback is its popularity. No one wants to stop once they've started, so make reservations to get your time in at the family console. (Available for the Atari only.)

Long Series:

The APASHAI adventures, Epyx

Consistency is the key here. *Temple of Apshai* begat *Upper Reaches of Apshai*, which begat *Curse of Ra*. The original also led to a sequel, *Hellfire Warrior*, which begat *Danger in Drindisti*, which begat the *Keys of Acheron*. Each game is enjoyable on its own, subject to a few starting limitations. Altogether, the six make up as real and exciting an alien world as you're likely to find in computer gaming. Unlike *Wizardry*, in which players wage combat through written commands, in the *Apshai* series, players must draw upon a combination of cunning and arcade skills to fight monsters either hand-to-hand or at a distance with a longbow. And this is by no means the end of it, either. (New games in the series are already on the way, for the Apple, Atari, Commodore, IBM, and TRS-80 personal computers.)

Multiplayer Arcade Game:

SOCCER, Thorn EMI

Up to four players can participate

in this joystick-operated sports simulation. All can play as a team against the computer, or the sticks can be split up in configurations pitting players against players. It's tough to learn, but well worth the effort. The control system allows you to pass, maneuver upfield while dodging other players, steal the ball, tend goal, and even take corner kicks. (See my review, p. 143.)

Most Realistic:

MICROSOFT FLIGHT SIMULATOR, Microsoft

This complex program, which teaches you how to fly a single-engine airplane, then invites you to use this knowledge to pilot a biplane in a World War I combat game, is the most advanced, realistic piece of gaming software I have encountered in the mass market. Played on the IBM PC, its control system requires a very delicate touch if you want to survive the rigorous takeoff, flight, and landing procedures. It offers players the chance to really "feel" what it's like to be aloft in a light aircraft. This is truly state-of-the-art software—so far ahead of the rest of the field that I'll be surprised if there are a dozen games that can equal it in the coming year.

Microsoft created this game for the IBM PC and has licensed it to Apple, who now manufactures it for their machines, though the latter just doesn't have the shine of the original version. Don't be misled by other flight-simulation programs. I've yet to encounter any other flight simulations that match the magic of Microsoft's program.

Most Intriguing:

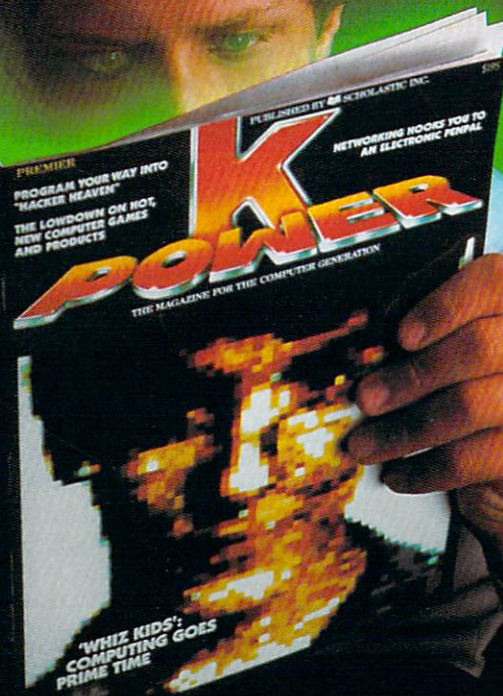
PINBALL CONSTRUCTION SET, Electronic Arts

Using a joystick control to move a pointer, you can fabricate your own pinball table, complete with all the features found in the real thing: bumpers, targets, lane guides, flippers, rollovers, gates, and slingshots. You can color in the screen with an electronic paint brush, and reshape the whole field, with "scissors," "hammer," and "arrow" controls. The most ingenious toy since the erector set, this is a trend-setter. (Available for the Apple, Atari, and Commodore 64, with an IBM PC version promised.)

AT THIS STAGE IN THE GAME

The concept of a "favorite game" is easy enough to grasp. But I should

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GAMES

explain the conspicuous absence of games for certain machines—particularly the Timex Sinclair, TRS-80, and Commodore VIC-20 personal computers. At this stage in the game, the nature of those machines, their low memory capacities, cumbersome keyboard controls, or lack of joystick options, prevent games made for them from coming anywhere near those for the Apple and Atari. As for games for the TRS-80, I just haven't encountered many that compete.

While there are sufficient numbers of games available for the TI-99/4A and Commodore VIC-20, none of the programs have the sophistication levels of games for the more powerful models. The present fortunes of Texas Instruments makes it unlikely that their selection of games will improve markedly, by this time next year. I do hope that the VIC-20's offering will have matured enough to be in serious competition. Software for the Atari and Apple computers still dominates the games market as we enter 1984. But IBM is on the march, and by this time next year could very well steal a hefty share of the business. **FC**

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If you have comments on this or any other gaming subject, or if you have nominations for your own favorite games, feel free to write. Send correspondence to my attention, c/o FAMILY COMPUTING, 730 Broadway, New York, NY 10003. Next month, I'll be introducing you to animator Don Bluth, whose popular amusement arcade game, Dragon's Lair is causing a stir in parlors across the country and may eventually find its way into your living room.

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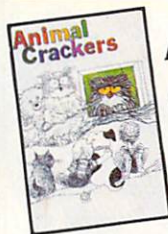
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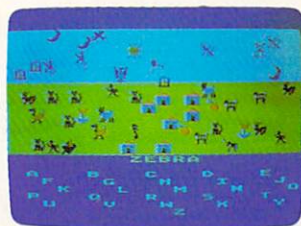
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HOME BUSINESS

IS YOUR COMPUTER A TAX DEDUCTION?

BY LARRY FISHER

Who among us hasn't felt that worrisome knot in the stomach as notes, receipts, and other tax documents are gathered to prepare for April 15th? "Have I remembered all my income? Will I forget to claim some deduction?" The questions can go on and on, but the one that we in computer-using families keep coming up with is, "Can I claim my computer as a tax deduction?"

Our friends and relatives may agree that we certainly spend enough time and money on our computers to claim them as dependents. It is a sizable investment. And we therefore have a sizable interest in the Internal Revenue Service's viewpoint on a personal computer—will it allow us to claim one as a tax deduction?

BRASS TACKS

The basic IRS rules allow deductions in the areas of expenses incurred in your trade or business, expenses incurred while collecting income from investments like real estate or the stock market, as well as the costs of preparing your tax returns. Those expenses must be directly related to the income or to the income-producing property.

If you are certain you qualify under these guidelines, it's likely you can claim your computer as a deduction. But what about most of us? We are in what IRS agent Bill Knight calls "a gray area."

HOBBYISTS IN BUSINESS

Many of us are into computing because we like it. It is our hobby, our fun and relaxation. But that doesn't mean we can't still make money



from time to time on a hobby that we can turn into a business. In fact, it's to our advantage to do so, since business use of a computer is deductible and recreational use is not.

If you're planning to deduct costs because you're using your home computer for business purposes, you must prove to the IRS that it is a business, not a hobby. If you've made a profit in two of the past five years, the government will grant you business status. Otherwise, the bur-

den of proof is yours.

The guidelines for hobbyists are pretty clear—income is taxable; losses are not deductible. If the hobby generates income in, say, one out of five years, you'll be able to *depreciate* your computer's cost that year. If your hobby continues to be profitable and gains business status, the expenses you incur in making that profit will be *deductible*.

Let's return to that "gray area" many of us might be in. Perhaps

LARRY FISHER is a freelance writer and electrical engineer who lives in Coon Rapids, Minnesota.

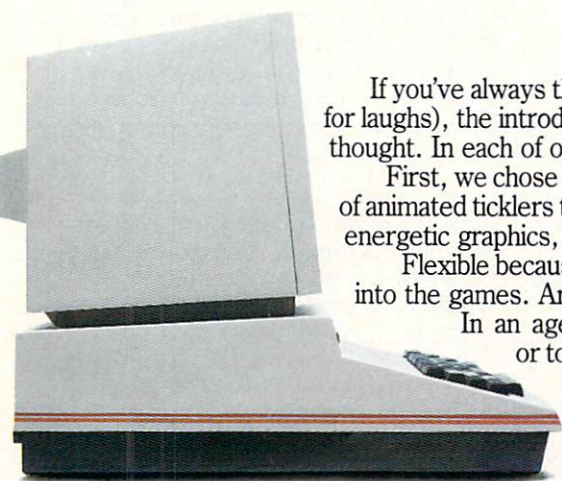
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HOME BUSINESS

we've bought a computer because of some possible income idea. We might want to design computer games for sale, file mailing lists, track our stock market investments, write research reports or novels, or tackle any number of ventures.

In order to deduct the total cost of the machinery and related expenses, you must be able to prove that you use your computer solely for your business or investments. Of course you are welcome to use your computer for a hobby or for entertainment—as it's likely you will—but you must then reduce your tax-deduction allowance accordingly.

Suppose you have a computer that you seriously plan to use for business. Despite your diligent efforts, you don't make a profit. The IRS will be out to show that you have a hobby and will want to disallow any deduction. How do you prove your presumption of a profit-seeking venture?

J.K. Lasser's *Your Income Tax* (Simon & Schuster) provides some suggestions: Keep diligent records, become well-informed in your business field, and put plenty of time and effort into your venture.

The best advice: Check with your accountant for an informed reading of the law and suggestions on how to best approach your individual situation. This is an area of limited legal precedent because it's so new. Personal computers have only become widely popular in the past two or three years. Since the IRS can take up to three years to request an audit of your returns, computers claimed as deductions in the past few years are just now coming up for review.

If you are audited, you will be asked for documentation to prove business use of the computer versus hobby use. Paper or disk files of the output would be valuable. Or a log-book showing all usage (hobby and business). Remember: Only the percentage of actual business use can be claimed.

EDUCATION

Another possible deduction avenue for a family is for an educational expense. Here you must be careful to claim education only to improve or maintain a family member's current job skills, not to prepare for a new profession. A good example of improving skills is a teacher who learns to program in order to teach

programming, or uses a data base to track student progress. An example of changing professions that would probably *not* qualify is a teacher who learns programming in order to get a job as a programmer, or a high school student who learns typing. In any case, only the percentage of the computer-related expenses used for education can be deducted.

The IRS warns that capital purchases may not be deducted as educational expenses. So the educational expenses allowed are electricity, blank disks, books, paper, computer courses, software, etc., but not the computer itself.

HOME USE

As computer use grows both at home and at the office, a number of people are wondering about the tax benefits of purchasing a computer

for home use. You might say, "I use a computer at work. My employer encourages me to become more familiar with its operation. I choose to buy a computer to practice with at home." Is that deductible?

According to one tax accountant, the answer is clear: No. If you only use the computer in your home to practice your skills, it is a personal expense. If you actually use the computer to do business, then some tax advantages are available to you.

An employee using a personal computer at home may claim every expense that is directly related to work for an employer. For instance, a manager might buy *VisiCalc* to work on business plans or budgets at home. Or an employee might get a modem in order to work on the company time-share computer in the off-hours. Of course, business use must

THE PAPERWORK

Once you decide to take the plunge to deduct your computer from your taxes, you must pick the proper place on your return to do so and become aware of the options available.

Forms: A self-employed person, even one with a sideline business, would use Schedule C of Form 1040 to itemize the profit or loss figures from the business. Equipment purchases, including the computer and other property, are detailed on Form 4562 (Depreciation and Amortization).

If you are employed by someone else and use your computer in your work at home, the related expenses are shown on Form 2106 (Employee Business Expenses). Transfer those totals to Form 1040—Schedule A—itemized deductions in the Miscellaneous Deductions area. Form 4562 is still needed to list your equipment purchases. (Of course, you can only use these forms if you have purchased a personal computer to perform job-related work at home.)

Educational expenses for an employee fit under Schedule A and Form 2106, the same as with other expenses. (If the education is for personal benefit, you can only list its cost on Schedule A [Form 1040] as a miscellaneous deduction.)

Depreciation: For new equipment purchased for your business in 1983, you may expense up to \$5,000 in the first year. For any amount over \$5,000 (and the total amount,

at your option) you may use depreciation or tax credits. Computers fall under the ACRS (Accelerated Cost Recovery System) five-year property category. If you use this method of depreciation, 15 percent of the cost can be written off in the first year, 22 percent in the second, and 21 percent each year for the third through fifth years.

Credit: An added bonus for those who depreciate the cost of their equipment is a tax credit. An additional tax credit of eight or 10 percent of the equipment costs may be written off in the first year of purchase. (Whether you choose to take an eight- or a 10-percent credit depends on your tax bracket.) If you take advantage of this option, use Form 3468 to claim the credit.

Extras: Don't forget to include all the costs associated with acquiring the computer system. Travel to and from the dealer (at 20 cents a mile), consultant fees, and other items should be on your checklist.

It's wise to get the necessary forms and instructions from the IRS as soon as possible so you can start to fill them out. Even if you think you might claim a computer next year instead of this year, studying the current forms and instructions will help in your planning.

Remember: the rules are changing every year. Study them carefully before you make your claims. Stay alert, flexible, and creative. —L.F.



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HOME BUSINESS

still be substantiated. A letter from your supervisor asking you to do work at home would be useful as proof to the IRS.

There are ways to deduct a personal computer on your taxes. But it is up to you to have proof to convince the IRS of the business or educational need and use.

And it's important to note the distinction the IRS makes in exactly what sort of business applications you have in mind. If you intend to use your personal computer solely for generating income, in stocks or

real estate for example, you can't claim the computer as a deduction—you must depreciate its cost over a period of years. [For details, see accompanying article, p. 40.]

Uncle Sam's rules are clear about only business or education uses being accepted. The family that uses its computer only to play games or to become familiar with using a computer cannot claim this deduction. And, if you intend to deduct computer-related costs incurred in the process of, say, investing in the stock market, be prepared to show a

substantial portfolio. The cost of a home computer will be difficult to defend if you only own a share or two of stock.

The entire "gray area" of computer deductibility will be subject to change in the next few years. There are going to be many families taking the plunge to claim as much of a deduction as possible. You can be sure the IRS will be keeping a careful eye on this area, so you, in turn, must stay aware of developments in the tax law and the best ways to take advantage of them. **FC**

BUT WHAT WOULD UNCLE SAM SAY?

Many novice computer users find the machines baffling at first, but quickly realize how useful they are in saving time and money. In fact, if you use a computer for your home business, it can actually save you money on your tax returns, once you figure out how the IRS rules apply to you. Because a growing number of people are finding new applications for their personal computers, we decided to take a look at what the IRS calls "a gray area."

For advice, we turned to an expert—Howard Davidoff, a lawyer and CPA who deals with tax law in his work at a large accounting firm in Manhattan. We presented him with a few sample situations families may encounter, and asked him to use his expertise in assessing the deduction possibilities. Keep in mind, however, that these scenarios are only *guidelines*. Howard—and the IRS—stress that every situation is different and no policies for computer deductions are carved in stone. Consult the IRS or your accountant to make sure that you qualify for a deduction or a tax credit.

Q. I teach art at an elementary school and have an Atari at home that my family uses for games, record keeping, and homework. Computer graphics intrigued me, so I enrolled in a course at the local community college. Can I deduct the tuition?

A. If you're only taking the course out of interest and for experimentation at home, no. But if you want to teach computer graphics to your students at school, yes. You can deduct a portion of the expenses relating to the course. Courses taken to improve your skills in your present position can be deductions.

Q. Most of the time, the TRS-80 in our home is used by my son, an aspiring hacker. When he saw me struggling with our income tax returns, he suggested I purchase a software program to ease the job. Any possibility of a deduction?

A. According to the Internal Revenue Code 212, Section 3, any business expense invested in preparing your income tax returns is deductible. Using a computer qualifies, as does paying an accountant to work on your returns. You can get credit for the cost of software, paper, electricity, etc., and, if you keep accurate computer-usage records all year, you can deduct the percentage of your computer's cost equal to the percentage of usage time dedicated to working on the returns.

Q. To keep records and prepare billings for my plumbing business, headquartered in my garage, I use an Apple IIe. Lately, however, my oldest daughter has been sneaking in there, spending hours upon hours playing *Wizardry*. Do I risk trouble with the IRS in claiming the computer as a business deduction?

A. Yes. It's important to keep a journal of your computer's use—hours of business work as well as time spent playing adventure games. On your return, you can deduct only the percentage of your computer's cost equal to the percentage of time you use it for business. For example, if you log 300 hours for your business and your daughter puts in 100 hours of gaming, you can deduct only 75 percent of the computer's cost. If you're audited, it will be your responsibility to account for the machine's usage.

Q. As a certified public accountant,

my work often demands more than eight hours a day, especially just before April 15. I'm often required to work on tax returns in the evening on my kids' Commodore 64. Any way to get a tax deduction for my overtime?

A. Yes, you may qualify for an allowable deduction under Internal Revenue Code 162, which allows deductions for "all ordinary and necessary expenses paid or incurred in carrying on any trade or business." So keep track of the hours you spend doing work at home, as well as costs of software, paper, etc.

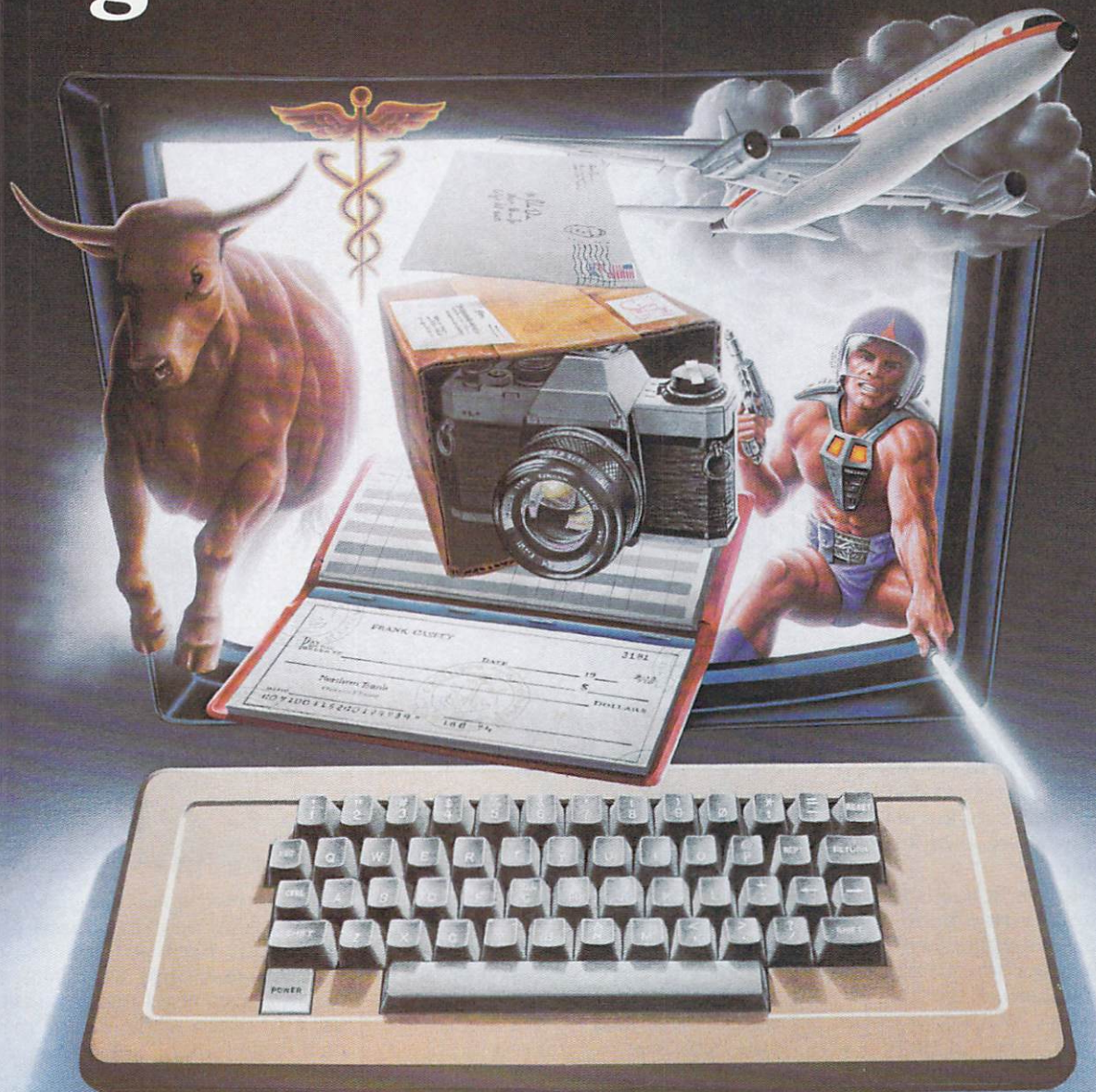
Q. My preschooler seems extraordinarily advanced for her age, so I bought some educational programs that provide her with drill-and-practice in beginning-reading skills. Can I deduct the programs or the computer since they're tied to education?

A. No. Capital purchases (the computer) may not be deducted as educational expenses, and other costs (software, programming courses) may only be deducted if they improve your skills in a profession, not if the goal is to prepare your daughter for a future as a best-selling novelist.

Q. I've been writing a coin-collecting newsletter on my micro since 1978. Despite my budgeting and corner cutting, I can't seem to make a profit. I do consider the newsletter a business, so can't I deduct my costs?

A. Probably not. To qualify for deductions, a business must show a profit in at least two of five straight years. With no profits, the IRS will presume it's not a business. Your job is to prove otherwise.

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ANATOMY OF A HACKER

BY SARAH KORTUM

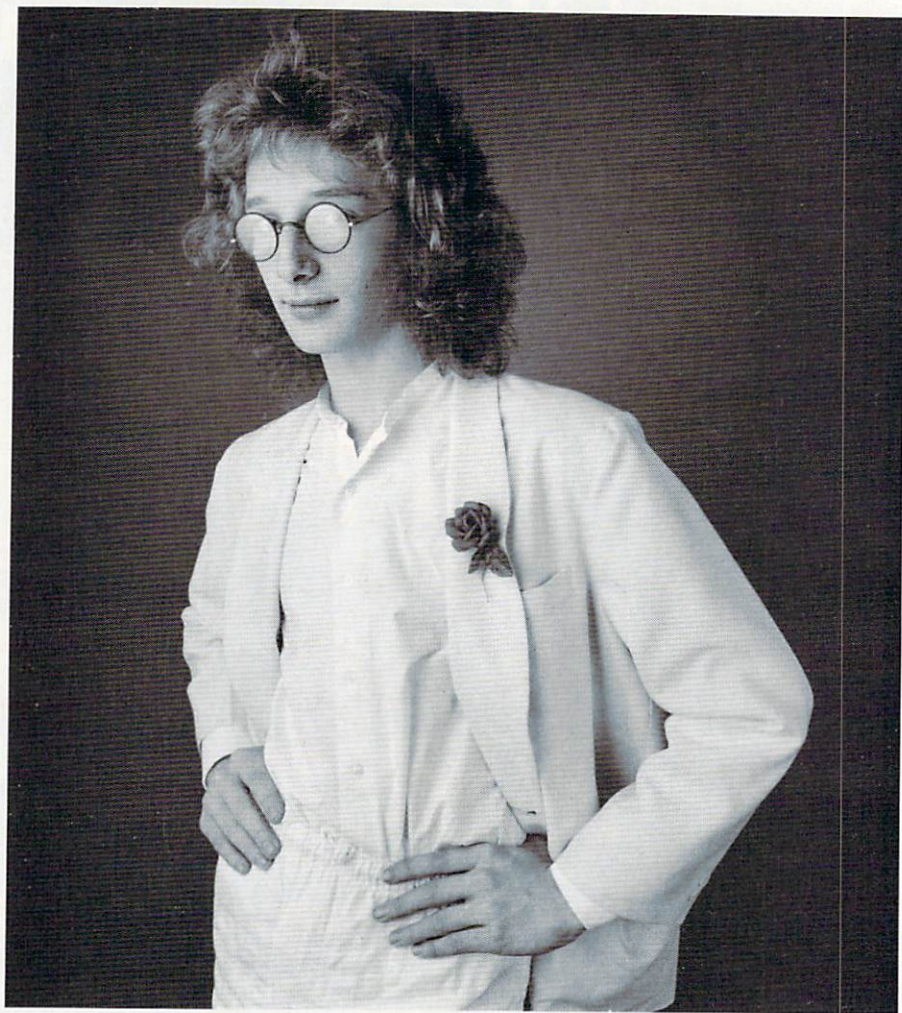
It's 1:00 a.m. and the majority of the students and professors at the University of Sussex are snug in their beds, safe from the harsh sea winds blowing in off the coast of England several miles away. But the lights are still blazing in the school's computer room, where a handful of students sit huddled in coats in front of terminals, since the central heating in the building has been turned off for hours.

These people are "hackers," people who compulsively program "not because they need the program, but just for the sheer pleasure of doing it," says 20-year-old Ben Rubinstein, a second-year student at the school and a self-described hacker.

There's a "wide range" of hackers in the computer room at Sussex, says Ben. "One guy has a little toothbrush mustache. Another looks quite young but is always smoking this [Sherlock Holmes-style] pipe, which looks really ridiculous on anyone under 50! Then there's this heavy-metal fan with long black hair and denim [clothing]. And a punk with a magnificent purple Mohawk. He'll be sitting there in chains and then put on his glasses and start typing away! And there are always a few dandies, who are always very trendy looking."

And then there's Ben: His oval face framed by long, unruly blond hair, his old glasses slipping down the bridge of his nose, and his elbow inevitably peeping out of the hole of his favorite shirt. Ben's appearance may be one of chaos, but there is order to his habits: He rarely loses his stainless steel lighter, or his scuffed and worn leather eyeglass case.

Ben first discovered computers in 1975 while attending Latimer Upper School in London. Twelve years old at the time, Ben would first write a program, and then transfer his program onto some punch cards that had been supplied by a teacher. His teacher would run the cards, which



Ben had laboriously punched by hand, through a mainframe computer at the University of London, and return two days later with a printout for Ben. Only then would Ben discover which holes he had incorrectly punched, after which he could begin to debug his program. His interest in computers lasted for only six months, and he soon returned to "tinkering with mechanics" and reading science fiction.

A couple of years later, as the first inexpensive home computers began to hit the market, Ben's interest was rekindled. He began to read computer magazines, and occasionally even to obtain hands-on access to a computer at a friend's house or a store. Shortly before his eighteenth birthday, Ben purchased his own com-

puter: an Acorn Atom.

"I was now applying things I had read about. Because I was able to accomplish one thing, it made me think of something else I might be able to do. And so the whole thing accelerated rapidly then," recalls Ben.

HACKER HABITS

In 1982 Ben began his first year at Sussex University, on the southern coast of England near Brighton. On his second night there Ben happened to meet "the most hackerish hacker on campus," at a local pub. They started discussing computers "and all of a sudden the sun was shining in the window, and the computer room was open." So they went off to the computer room. "And the next night the same thing hap-

SARAH KORTUM is *lifestyles* editor of FAMILY COMPUTING.

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pened, and it has sort of continued in that vein ever since." The computer room has become his "home base," explains Ben. "It's a place I return to, it's not a place I go to."

"I've had hacker habits a long time," even before he got a computer, claims Ben. "So the computer didn't change my life. I used to not be able to go to sleep without reading a book from start to finish." He's now kicked that habit only because by the time he retires it's often after having been up for 24 hours straight, much of that time in front of a computer.

Many student hackers who work on terminals connected to a school's big mainframe computer prefer to work at night because that's when the system is the least crowded and performing the fastest. But the real reason hackers work at night, says Ben, is because "you get locked into it." This applies to mainframe users as well as people working on micros in their own homes. "It's not a question that you want to work at night," explains Ben. "You may start at a perfectly reasonable hour. But you don't stop!"

After a long night of hacking in the cold computer room, there's

nothing more appetizing than a big plate of spaghetti in the morning, says Ben, who then falls into bed after setting his five alarm clocks, which he describes as another "testament to the computer."

What's so much fun about a computer? "It's a challenge," replies Ben. "You're trying to get this thing to do precisely what you want it to do. And you can never make it work right the first time. You always think it's easy, you always think it will take you an hour, and it takes you three weeks before you get it working right!"

"It's a problem-solving compulsion. It's possible you could solve the same problem with a pencil and paper, but your attention wouldn't be so caught. When you type in a line on a keyboard, as soon as you hit RETURN, the computer doesn't stay still like a pencil and paper would. It does something back at you." Sometimes it does something wrong. "So you think, 'Oh, I'll just fix that.' And when you're done you say, 'I'm going to go now, I'm just going to see what happens when I run that new little bit.' And you run it and the computer does something unexpectedly wrong! So you think 'I wonder why

that happened!' And you sit down again and half an hour later you're still there. A computer is very difficult to get up and walk away from."

"Frequently I'll say to one of my friends, 'I'm going to go off to the computer room, but I'll come join you at this time and at that place. And always when I think I can do both,' the computer wins out, explains Ben. "I'll suddenly realize an hour after the time I'm supposed to meet my friend, that I'm still sitting in front of the computer. I don't think the computer has improved my social life," says Ben. "It's only damaged it!"

Does that worry him? "Yeah," he concedes. "For example, when I first went to Sussex, I deliberately left my [own] computer at home, just to ensure that I wouldn't shut myself up in my room and thereby not meet anybody at the time when everyone was making friends. I didn't plan to get it for at least two weeks. But in the end I broke down after a week and got it!"

COMPUTER KINSHIP

Often the achievements that might "evoke admiration" among fellow hackers, leave a noncomputer user

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cold, says Ben. Such as writing short programs that accomplish a lot, or perform very fast, or store the maximum amount of data in the minimum amount of memory, or use some obscure feature of the computer to execute a task in a novel way.

"Occasionally I'll feel incredibly proud of myself because I've just done something clever on the computer and I'll want to tell someone about it," says Ben. If there's no hacker in sight, he might try to share his accomplishment with one of his friends, 70 percent of whom are not involved with computers. "I'll grab a friend and try to explain it to them. And because they're my friend, they'll say, 'Well done.' " But it's not quite the same!

For that reason some hackers prefer the company of other hackers to the exclusion of anyone else. But this may stem from an insecurity that "without their computers they're virtually nothing," says Ben. Because for many hackers, computers are "the only thing they can really talk about.

"Some hackers got into calling other hackers by their user names," even outside the computer room, says Ben. (A user name is the spe-

cial name by which a computer system knows you. You use it when you sign on to the system, and others use it to direct messages to you.)

"Possibly they learned the other person's user name before they learned their real name, and the habit stuck. But it may also be partly that they want to keep up the atmosphere from the computer room. They're sort of reminding each other that 'we're hackers together!'"

This kinship among computer users can span all ages, backgrounds, and even nationalities, says Ben, who has met many American hackers. And it's a warm feeling when you discover that the stranger you're talking to at a party is a fellow hacker. "You'll soon be chatting away like old friends!" says Ben. "Discussing this program you've just written, or that language, or this machine."

Discussions about specific machines can often turn quite heated. "People get very passionate and very involved with their own [brand of] computer," observes Ben. "Perhaps it's because the computer has become part of their identity, what they're proud of in themselves. If you mention some little fault or disadvantage of a person's machine, they'll often defend it to the death,

and given the slightest chance, they'll even try and turn that bug into a feature!"

"COMPUTER NERD"

But the difference between the graphics modes on one computer versus another may seem meaningless to an outsider, who might then categorize all hackers as boring. This happens quite frequently says Ben, who resents it. "A lot of non-computer people lump anybody who uses computers into one stereotype of a person who can only talk about computers, only think about computers, who is arrogant and smug and thinks they're better than people who don't know about computers, who is socially inadequate, and who is not only boring but probably slightly pathetic because all they can do is play with computers!

"You can always sense when somebody is building up this image of you as another one of 'those computer nerds,'" says Ben. "It's happened to me several times." One story he relishes telling is of the time he was working on his computer in the Sussex flat he shared with other students.

"I was trying to fit a new keyboard to my computer," recalls Ben. "I had

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all these maps I had drawn of my keyboard strewn around the table, and I was surrounded by an incredibly complex spaghetti of wires going all over the place. Every now and then I would press something to test things, and the whole thing would virtually blow up!

"A friend of [one of my roommates] walked in, and sat down and started idly chatting away. The person said, 'So, what's your subject? Electrical engineering or computer science?' And I could detect the slightest sneer as they said it, because they were doing English literature, which they thought was the most important and interesting thing to do. And so I said with a quiet smile, 'Well, actually I do philosophy!'—which isn't the whole truth!" admits Ben, who has a split major of philosophy and artificial intelligence. "They looked very surprised and didn't say anything for a few minutes, and then said, 'Oh.' It's very satisfying to be able to destroy that image in a person's mind," smiles Ben, "especially when you're being thought of

as a boring computer person.

"And some hackers are very happy to be identified with that stereotype," he continues, "because it makes them feel that they are a special, known group of people. They'll go around wearing buttons that say, 'I'm a hacker, I don't know the meaning of sleep.' It makes them feel like they're sort of famous. They've read articles about themselves in the *New York Times*."

THE GOOD OL' DAYS

But there are other hackers who prefer the old days, when very few people knew what a computer was, let alone owned one. The small size of their ranks back then had made them feel sort of special. "It might give you some sort of status to have had a computer before the vast wave of home computers hit," says Ben. And some of those hackers feel "just a bit sad . . . that everybody else will now be just as good as they are!"

Some hackers enjoy it when people enter the computer room at Sussex, "very warily, because they think this

thing is a giant brain, and they've heard that these computers are getting more and more in control, and so they sort of cautiously stand by the door and look around," says Ben. "And then they'll come over and look over your shoulder. And finally they'll say, 'So, is this thing a computer? Can you ask it anything? Does it know who won the World Cup in 1947?'"

To preserve this air of mystery, some hackers try to make the computer "sound like it's an incredibly difficult arcane science that only they and their friends know." That's why some noncomputer users sometimes get "this sense that you need to have this vast body of knowledge to even use a computer."

But now that computers are becoming more readily available, people can discover that "computers are easy. You have to be able to think logically, but not in a way that's beyond anybody and everybody," says Ben. In no time at all, "you can write a three-line program in BASIC. It may take you several tries before you get it right, but when you do you'll feel very happy and proud when you get HELLO written a thousand times across the screen!" And once you've done that, you can go on to something else and pick things up, step by step. "I did," says Ben.

"On the whole I think hackers are very eager to be helpful," Ben says. "Because when you're a computer person, and you meet someone who has any of a whole lot of illusions about computers, there's this terrible urge to . . . spread the gospel."

"You'll be at a party and somebody will throw out this chance remark that might happen to be this terrible, terrible misconception about computers. And the urge to set them right is so strong! And having set them right you then want to teach them everything about computers. Everything in general about what a computer can do, and then you want to start to teach them how to program! And they'd really rather wander off and get another drink but you're insisting, 'No, no, but listen! You start with these line numbers, and you've got a command like PRINT . . .'" Soon this glazed look comes over their eyes!

"A computer is just a tool and a toy. For most people it's more of a toy than a tool. And hackers," concludes Ben, "are basically normal people who happen to have a very absorbing interest." ☐

HOW TO HANDLE A HACKER

What a hacker says and what a hacker does may be two entirely different things, says Ben Rubinstein, a confirmed hacker.

"I do mean that I will be there at this time, I do mean that I will finish in five minutes, so it's not totally fair to say that I lie." But when it comes to gauging time, "if I actually thought about it I would know that I'm wrong!"

So it's up to you to read between the lines, especially when you hear these statements:

1. "I've almost got my program working now!"

This statement is rarely true, and the consequences of believing it can be detrimental to you, especially if you're meeting your hacker friend on some middle ground, like outside a movie theater. Very rarely are programming problems solved in the time it takes for a full-length feature film to play. Your friend will inevitably still be winding up the program as the curtain goes down.

2. "I'm just going to add this one feature!"

Even if hackers tell you they're not going to complete their program, they're just going to add one little

feature, watch out, warns Ben! "Because your back will be turned at just the moment when they complete that feature, and they'll go on to something else. Not deliberately. It's just something that they do." When you confront them with the fact, "They'll say they didn't notice. And it's true, they probably didn't notice!"

3. "But, I just want to save the program!"

"If a hacker tells you they just want to save a program, you should let them do that," advises Ben. First of all, "that is a process with a definite beginning and definite ending." But most of all "if you don't let them [save it], they're only going to spend more time in front of a computer!"

4. "Let go of my arm!"

Don't listen to this statement, especially if you're dragging your hacker away from the computer and toward the front door. Even a confirmed hacker like Ben admits that "a good way to deal with a hacker is to use force. Make them go out. They'll hate you for it, but it will do them good in the end. They'll never really miss one more night of hacking away!" —S.K.

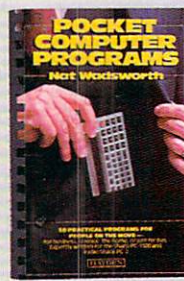
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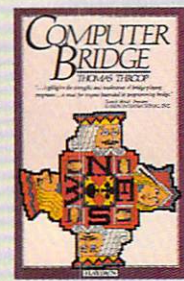
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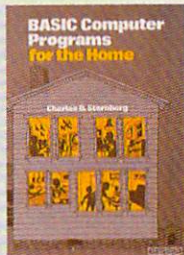
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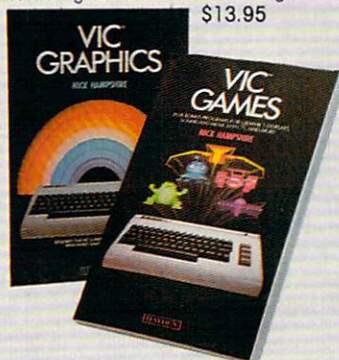
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COMPUTING CLINIC

A COMMODORE COMMAND/ MAIL-ORDER BUYING/ DISK-LIFE EXPECTANCY

BY WALTER KOETKE

When I enter the command SPEED-100 on an Apple computer, it displays everything more slowly. Is there a way to do the same thing on my Commodore 64?

MADISON SCOTT
Amarillo, TX

The Commodore 64 does not have a single command similar to Apple's SPEED, but you can display specific strings on the 64 using a routine like this:

```
10 XS = "DISPLAY SLOWLY"  
20 FOR P = 1 TO LEN(XS)  
30 PRINT MIDS(XS, P, 1);  
40 FOR C = 1 TO 300  
50 NEXT C  
60 NEXT P
```

The speed of display is controlled by the counting loop in lines 40 and 50. Changing 300 to 600 in line 40 would make the letters appear half as fast.

I'm storing various records—such as health insurance—on a disk. I want to keep the records indefinitely. How long can I expect a disk to last? What should I do to ensure that the data will be there when I want it?

LISA GENESEN
Joliet, IL

When I'm dealing with very important data I get very conservative. Vendor claims of disk life vary widely. I'd rather rely on experience.

First, buy high-quality disks. Saving 50 cents on the original purchase is no gain if data is lost. A disk used daily should be replaced at least every four months. I suspect

WALTER KOETKE was the first person to introduce computers to U.S. public schools, linking the Lexington, Massachusetts, system to a mainframe in 1964. In 1969, he worked with Seymour Papert, inventor of Logo, to introduce that language to the same school system. Koetke frequently lectures about computers to parents and educators.

most disks will last much longer, but four months of trouble-free operation is almost guaranteed.

To help ensure that data is not lost, I make two backup copies of critical disks. The backups should be stored in different places, separate from the original. This reduces the chance that stray magnetic fields, children, leaky pipes, theft, or any other potential danger will destroy all of my copies at one time.

I haven't seen statistics regarding the life of disks, but they should last for quite a while. If the disk is stored between 50° and 120° F. with 15 to 70 percent humidity, and kept dust-free, a life of several years seems very reasonable. With my conservative approach, I suggest copying the archive copies every two years.

Although I firmly believe in technology and progress, I also believe in making printed copies of truly critical data. The durability of household records recorded on paper appears nearly eternal. Just look through your attic or basement.

Does it hurt to leave your computer on for extended periods of time?

NICK WAUGH
West Peru, ME

If your computer has adequate ventilation, then leaving it on for a long period is better than turning it on and off several times in a short period of time—just as with a car engine. The electronic components of a computer are more likely to be damaged while warming up or cooling off than by being left on for an extended period.


I assume that "leaving the computer on for an extended period" also means unattended use. This should not be a problem for your computer or disk drive. But in spite of occasional claims to the contrary, I definitely do not recommend allowing a printer to operate unattended.

The chance of overheating when a paper, ribbon, or print head jam goes unnoticed is just too high.

Friends have told me to watch my step when mail ordering computer equipment. How can you tell from an ad whether a place is reputable or how long it will take them to deliver?

HUGH McCARTEN
New York, NY

I believe the vast majority of mail-order dealers are reputable. I also believe that major magazines refuse advertisements from vendors about whom many readers have complained. The September 1983 issue of *Consumer Reports* stated that almost no complaints against mail-order dealers have been made with Consumer Affairs Offices and Better Business Bureaus. The major benefit of dealing with a mail-order dealer is lower cost, and that's about all you can really tell from an ad.

Be sure you don't overlook the several disadvantages of mail order. If you need help, you're quite likely on your own. Little problems can be difficult to diagnose over the telephone, even if the mail-order dealer is willing to try. A telephone plea for help is not nearly as rewarding as some friendly guidance from the local store. Service can also be difficult, time consuming, and more expensive if you must ship your unit back to a mail-order house rather than carry it to a local vendor. My advice is to buy the hardware from a local vendor, then purchase most of your software at a discount using mail order. The risk of getting defective software is very small. Just don't expect the local dealer to help you use the software when you occasionally have a problem. 

Send your questions, either general or machine-specific, to: Computing Clinic, FAMILY COMPUTING, 730 Broadway, New York, NY 10003. Please include your name and address.

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Buffalo, New York, is famous for its grueling winters. The temperature falls well below freezing in January, and the average snowfall is two feet. Like hundreds of her neighbors, Ellen Busman spent lots of time last winter talking about a warm-weather vacation. She and her seven-year-old son, Doron, finally decided on a week together this past fall at the Punta Cana Club Med resort in the Dominican Republic, a hideaway that features computers—along with the sea, the sand, and the sun.

"This is our first vacation together since I got divorced," said Ellen. "We considered all variations of car trips; we considered resorts. Club Med stood above the rest. I'd been to Club Med locations before, but the computer was the main attraction at Punta Cana. My only concern was whether children would be welcome, and that was not a problem at Punta Cana since it's a family Club Med. I knew there would be other children there."

Club Med in Punta Cana, on the eastern coast of the Dominican Republic, had 57 Atari 800 and 1200XL computers when Ellen and Doron vacationed there. Using the computers is just another activity—like snorkeling and windsurfing.

Both mother and son were eager to spend some time at the machines. Ellen, who has recently become a senior financial analyst for a bank in Manhattan, had used an IBM at work, and Doron had explored computers at school, at friends' homes, and when visiting his father.

At Club Med, guests of any age or computer-literacy level can sign up for individual instruction or just play around on the machines at their leisure.

"I thought of [computers] as toys until my office got one in February," said Ellen. "Before that I was never particularly interested. I don't get along with machines and had no background for computers. But now we get along beautifully. At first all I wanted to do was play on it to see what it could do. Then I got excited. When I saw how much faster I got my work done, I was convinced. Soon there won't be financial analysis without computers."

But Ellen was looking for more than professional training on the machines: "I wanted to be able to play with other machines in a relaxed manner at Club Med."

Doron, who had played math games on the Apple at school when he was a first-grader, was also hoping to explore new programs at Club Med. "I play on a computer once or twice a week. I've played with ColecoVision and Atari and I've used my dad's computer. I like to write on it. The games I like best are *Zaxxon*, *Donkey Kong*, and *Galaxian*."

During a fun-filled week in Punta Cana, Ellen Busman watched Doron's enthusiasm for computing grow. Here's how it all happened.

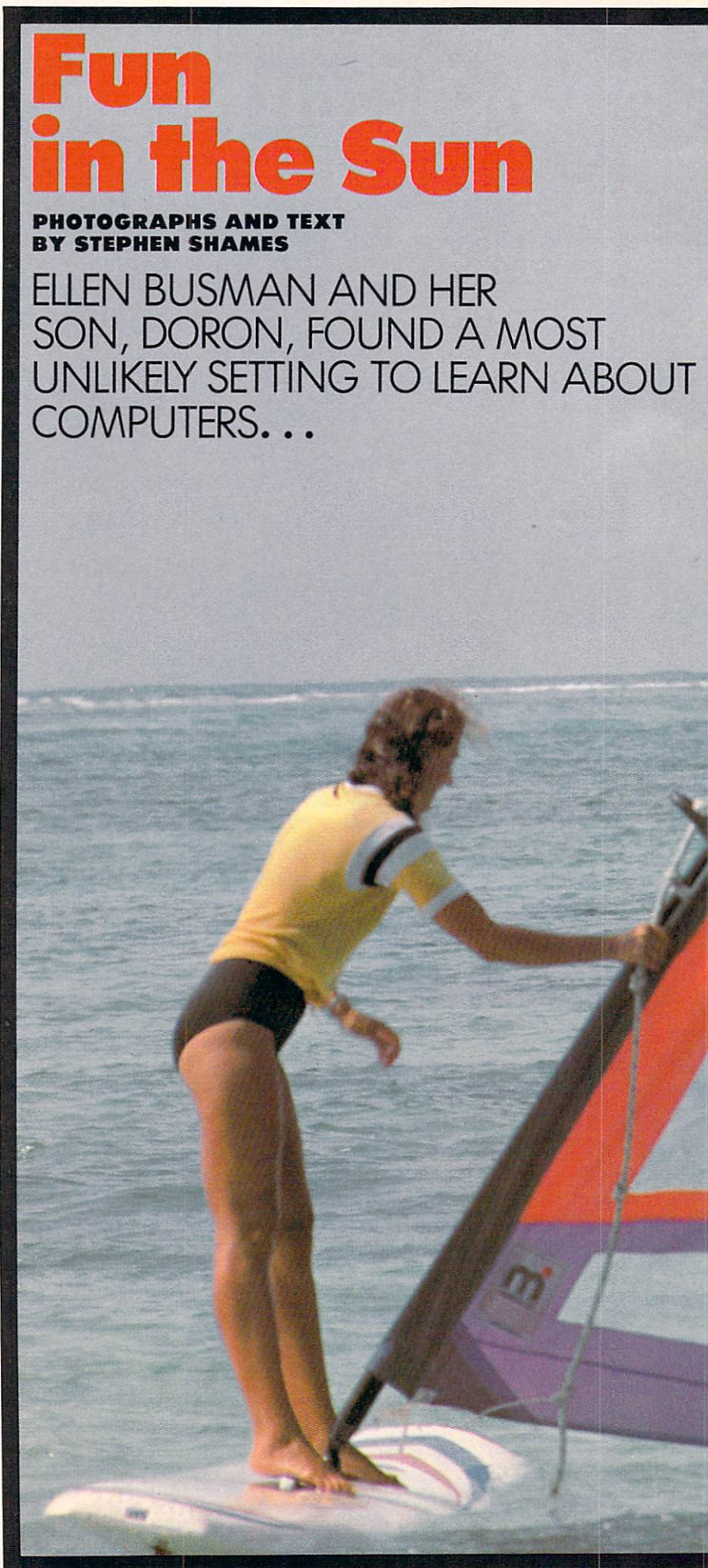
SUNDAY

Ellen wastes no time on her first day in the tropics. Right after breakfast, she goes into the *palapa*, the thatched-roof building that houses the computers. An instructor greets her and agrees to show her *VisiCalc*, a popular spread-

Fun in the Sun

**PHOTOGRAPHS AND TEXT
BY STEPHEN SHAMES**

ELLEN BUSMAN AND HER
SON, DORON, FOUND A MOST
UNLIKELY SETTING TO LEARN ABOUT
COMPUTERS...



STEPHEN SHAMES/BLACK STAR



**"AT CLUB MED,
IT'S REALLY
PAINLESS TO
USE THE
COMPUTERS."**

sheet program. For the next two hours, Ellen experiments with the program.

"I wanted to see *VisiCalc*. Since my office uses another spreadsheet program, *Microplan*, it was my only chance to see *VisiCalc*. I'd use a spreadsheet when I wanted to do investment analysis, because you can manipulate the columns and also set up categories from scratch. Suppose you want to know the subtotals by month. You can add columns 1, 2, and 3 and put the total in column 7. For example, what percentage of column 6 is column 4? At the bank, I do amortization of loans. In *Microplan* it is very easy to write this in. I want to see if I can program *VisiCalc* as well."

"I keep a spreadsheet at home now, using a pencil and paper. It helps me budget, but a computerized spreadsheet would be faster. It would allow me to keep track of my income systematically and also to consider many more 'what if' budget questions. But I'm not sure these advantages are worth the cost of the computer for my home budget."

MONDAY

At 9 a.m. Ellen goes off to the tennis courts for a lesson, and Doron to his lesson at the Mini-Club, where activities are designed especially for children. Ellen plays tennis with four other adults. At 9:45, while running after the ball, Ellen falls and injures her foot. Her ankle is bandaged and she is given crutches. The rest of the day is spent sitting around the pool. Everyone is very helpful, bringing Ellen food and drinks. A few of the men even carry Ellen around when she has to move. In fact, Ellen is not able to do much except sit by the pool until Thursday when she will go sailing.

TUESDAY

Doron continues to go to the Mini-Club every day. He plays computer games with 10 other children who range in age from five to 13. The children are from France, Italy, England, and the Americas. Although they cannot easily communicate with each other in words, they all know the computer games and play together using simple gestures. Among the many games they play are *Pac-Man*, *Missile Command*, *Canyon Climber*, *Frogger*, and *Qix*. The Mini-Club also has educational programs, including the *Bank Street Writer*, a children's word-processing program, and *Logo*, a language for creating geometric figures. There are also a number of educational games for children that emphasize math, geometry, and geography.

The instructors are competent computer teachers, skilled at working with children. The Mini-Club also teaches advanced programming (in *Logo*) to children, but no one was that advanced the week Doron was there. "The emphasis is on fun," explained the instructor. "We let them go at their own speed."

During the week, Doron tries a number of programs. The most complicated is an animation program designed exclusively for Club Med by Wayne Harvey of Atari. This program simultaneously runs a combination of programs, including *Paint*, *Music Composer*, *Player Maker*, and *Screen Maker*, to create an animation with figures moving across the screen to words and music.

Doron is pleased with a painting he creates and zooms in on a detail he likes. He asks the instructor, Bob, to photograph it so he can show it to his mother and to save it on the disk so he can use it in his animation.

WEDNESDAY

Doron continues to work on his animation. He creates four men. Using a joystick to program the motion and the timing, he "teaches" the men to move through his picture. By the end of the day he is ready to add words and music, but Doron is tired and decides to stop. His animation has taken him two days to create and he is proud of it just as it is.

THURSDAY

Doron begins his first day of programming in *Logo* by making a square. He must instruct *Logo*'s graphic "turtle" how to move. The program Doron draws for a square looks like this:

* TO SQUARE

* REPEAT 4 (FD 10 RT 90)

* END

This means repeat four times: forward 10 spaces, right turn 90 degrees. The "turtle" follows these instructions leaving a line behind it as it moves. The computer responds: SQUARE DEFINED. Then all Doron needs to do is type in SQUARE, and a square 10 units in length is drawn. Doron goes on to make a circle, a rectangle, and a triangle.

FRIDAY

Ellen enters the *palapa* at 4 p.m. to try word processing. Eva, one of the computer teachers, suggests *Logo* instead. Ellen concentrates, stopping only occasionally to glance out the window at the palms, the sea, and the beach. First she makes a square. Easy. Then, Ellen tries to put a triangle on top of the square to make a house. Trouble. The triangle does not fit on top but sits off to the side. Ellen sighs and tries to figure out what went wrong. She consults the manual and realizes she must reposition the turtle before starting the triangle, which she does. The triangle now is on top of the square, but it still does not sit on top of the house like a roof.

A small crowd gathers, making suggestions as they watch. "Turn it 90 degrees." Ellen does, but that is too far and the roof becomes lopsided. She tries again. Success! Ellen has drawn a house on the computer. She yells, "Look, I did it!" and the others cheer.

Ellen goes on to try to connect four houses together and things go faster this time. She is catching on quickly now and makes a suburb. Ellen runs the suburb program again and makes a city. She is so involved that she has not noticed the sun go down.

SATURDAY

All the sad faces mean it's time to go home. Ellen exchanges addresses with her new friends before she and Doron get on the bus.

LOOKING BACK

Was it worthwhile?

"Yes," says Ellen, "At Club Med, it's really

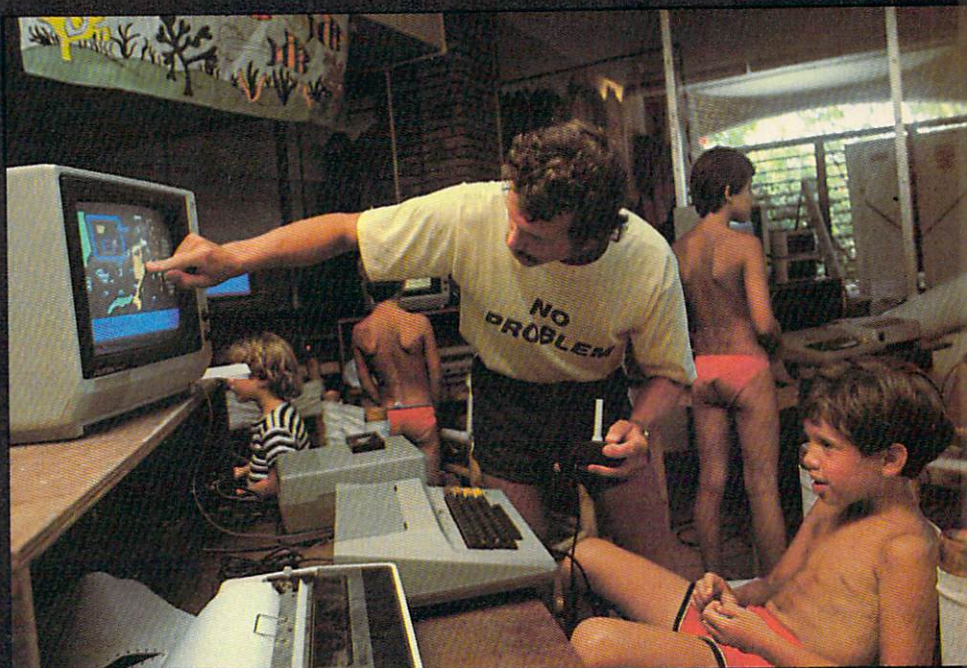
STEPHEN SHAMES is a photojournalist who has traveled the world for magazines such as *Newsweek*, *Travel and Leisure*, and *Time*.

COMPUTER

Workshops at the Palapa



	SUN	MON	TUE	WED	THU	FRI
10:00	INTRODUCTION to the COMPUTER	basic 1	basic 2	basic 3	basic 4	basic 5
11:00		INTRO	word processing	LOGO	Paint	Visual
2:00		basic 1	basic 2	basic 3	basic 4	basic 5
3:00		INTRO	Paint	word processing	LOGO	word processing
4:00		basic 1	basic 2	basic 3	basic 4	basic 5
5:00		INTRO	Visual	Paint	word processing	LOGO
6:00		GAMES				
	CLOSED SATURDAY					



Ellen and Doron can choose from a wide variety of computer classes and get individual instruction.

painless to use the computers. At home, I never have the time. After work, I'm tired. I come home, make supper, do laundry, and have parenting responsibilities. I don't want to get home an hour later because I stopped off to see computers." Ellen feels she accomplished a lot during the week at Club Med. She used a computer she'd never used before (the Atari 800); she tried *VisiCalc* and *Logo*. Doron played dozens of new games, learned *Logo*, and developed a love for the computer.

"One of the reasons I came here was to introduce Doron to computers. It would be a travesty for his generation to graduate from school without a working knowledge of computers.

"He had a blast. He liked all the creative things he did with it. He liked painting and typing his name. He told me he really loves the computer. And now he's pressuring me to buy one. He convinced me by saying, 'It's more fun than TV!'

"He's developed a positive attitude toward something he's going to need. That's better than anything else I could have done to encourage him. It's *his* accomplishment."

What does Ellen think about Club Med? "The appeal of Club Med is the openness. They give you the feeling that anything is possible, that things are completely free. But the rules are still there. You feel safe.

"One unexpected benefit has been observing my son. I see him differently here. At home, caretaking is the most important thing. First you have to check and see that lunch is made, then you can relate. Here I just enjoy seeing him. The pressure is off. We are sharing this experience together. I've had some really nice moments here."

And what is Doron's reaction? "I'd like to come back. I'd come to Club Med without a computer, but I don't think it would be as much fun." **fe**



CLUB MEDS WITH COMPUTERS

There are five Club Meds with computers: Punta Cana (Dominican Republic), Eleuthera (Bahamas), Caravelle (Guadeloupe), Ixtapa (Mexico), and Copper Mountain (Colorado).

This winter there will be Mini-Clubs for children at Eleuthera and Copper Mountain. (Punta Cana will sponsor only three one-week Mini-Club sessions in January and February.)

Prices for a week (January 7–April 14, 1984) range from \$530 to \$830 per person, plus airfare and a \$30 club membership fee. Airfares from New York City to the five clubs range from \$329 to \$529. There are discounts for children under 12. Some clubs offer a 25 percent discount to all children. Others offer 50 percent off for kids eight to 11 and allow four-to-seven-year-olds to stay for free. Check with Club Med for details; (800) 528-3100 or see your travel agent.



A vacation at Club Med was a chance for Ellen and Doron to spend some special time together—and apart.

Coleco's ADAM

THE VIDEO GAME MAKER COMES OUT WITH A COMPLETE COMPUTER-IN-A-BOX

BY CHARLES H. GAJEWAY



The ADAM is a complete computer system (including a daisy-wheel printer) that sells for around \$750. All you need to start computing is a TV.

ADAM FACTS

MEMORY: 80K RAM, expandable to 144K
USER-AVAILABLE MEMORY IN BASIC MODE: 26K
 (for unexpanded model)
VIDEO OUTPUT: TV or monitor
TEXT DISPLAY: 36 char × 24 lines; 80 char
 × 24 lines with 80-column adapter
 and monitor
GRAPHICS: 16 colors, 256 × 192 (maximum resolution)
SOUND: 3 voices, 5-octave range
KEYBOARD: Typewriter-style, 75 keys, 6
 multifunction "smart" keys
SUGGESTED RETAIL PRICE: \$750, includes
 printer (80 columns, 10 char per second),
 2 joysticks with numeric keypads, keyboard, memory console

Most computers are assembled from components bought separately. Consumers attracted by the low price of the Central Processing Unit, or keyboard unit, often find that they have to spend a considerable amount of time and money to put together a working system. Not so with Coleco's ADAM. The whole system comes lock, stock, and barrel in one box. If you have a TV, you're ready to start computing.

The major part of ADAM is the popular ColecoVision video game system; and if you already have a ColecoVision, you can turn it into an ADAM with an expansion module (for about \$500). Because Coleco believes that playing games and word processing are the two most popular applications for home computerists, the ADAM is geared for both and has a built-in word-processing program.

Packaging all these features into a computer that works well and sells for \$750 is an ambitious task, one that many didn't think was possible. Did Coleco do it?

OPENING THE BOX

The box the ADAM system comes packed in is impressively large, complete with all the necessary cables and connectors, several instruction manuals, and three of Coleco's special "data packs," which are a cross between cassettes and floppy disks (SmartBASIC, Buck Rogers, and a

blank disk for storage). The system includes a keyboard, a memory console with a data-pack drive, two joysticks with numeric keypads, and a daisy-wheel printer. In the future, a disk drive and modem will be available.

The set-up guide gives clear, explicit assembly instructions, and the system sets up easily. The cables and connectors are sturdy, fitting with a reassuring precision. While ADAM is constructed largely of plastic, the unit, with the exception of the printer, looks and feels solid, with no gaps or sharp edges.

THE COMPONENTS

Keyboard. The keyboard is superb. Key spacing and "action" are professional. There's a set of dedicated keys (PRINT, STORE, etc.) for the built-in word processing, and six function keys. ADAM rates an A-plus here; both experienced computer users and novices tried it out, and all were impressed.

Memory Console. The memory console, which connects to the keyboard with a cable, is also very good. It has a low, sleek profile, yet the data-pack drive and ColecoVision cartridge port are easily accessible. My only complaints are that the data-pack drive door opens with a jarring clunk, and the unit is not big enough to be tucked under a monitor to create a compact grouping.

Digital Data Packs. The data-pack drive, which accepts digital data packs (they look much like cassettes), is a cost-effective compromise between audio-cassette storage and a floppy disk drive, and stores a sizable 256K. While not as fast as a disk drive, particularly when saving a file, data packs are not as painfully slow as an audio cassette. [See "Buyers' Guide to Mass-Storage Devices, p. 86.] Reliability was good and ease of use acceptable, but the thin tape is fragile and more prone to accidental damage than a disk, particularly from younger family members. The BASIC tape, in fact, would not load after just two days of use.

Screen Display. The screen image is on a par with that of the Commodore 64—good but not exceptional. The 36-character screen display is stable, but ghosting and interference detract from sharpness, which can be annoying when word processing.

Printer. The printer is the only part of the system where cost cutting is obvious and detrimental. It is a letter-quality daisy-wheel printer, but is extremely slow (10 characters per second), and has a flimsy, toy-like

CHARLES H. GAJEWAY evaluates computer hardware and software for Merrill Lynch & Co., where he works, and has tested programs under development from Lotus Development (1-2-3) and Bruce & James (WordVision). He is also the author of "HomeCalc," on page 79.

feel, particularly in the paper-handling mechanism. The printer's design seems susceptible to breakdowns, a problem made worse because the power supply for the entire system is in the printer. If the printer has to be repaired, the computer is unusable. Coleco should have located the central power supply in the memory console; a computer temporarily without a printer is a lesser evil than a family temporarily without a computer.

While the reliability of the printer is a question mark, the noise it makes in operation is very real. Several people remarked that the shocking clatter would give them serious reservations about purchasing an ADAM system. I would have to agree, since the printer woke my daughter from a sound sleep twice while I was testing the machine. A user could rig a foam-lined box to absorb some of the racket, but Coleco needs to revisit the drawing board on this one.

ELECTRONIC TYPEWRITER

If a program data pack is not in the drive when the machine is powered up, the user is greeted with a screen titled ADAM'S ELECTRONIC TYPEWRITER. In this mode, whatever is typed at the keyboard immediately appears both on paper and on the



Coleco's digital tape drive, which runs programs stored on data packs, looks much like a cassette tape recorder. However, it is much faster, and can be operated under computer control. With data packs, which look much like cassettes, you can locate files or programs much faster than you can on cassettes.

screen. Just as with a typewriter, the only controls are margins, tabs, and margin release. Highly useful for short notes and letters, this built-in program eliminates the need for a typewriter in the house.

WORD PROCESSING

Coleco calls its built-in word-processing software *SmartWRITER*, referring to its reliance on the six variable function "smart keys" used to control many of the editing features. A reasonably powerful and complete word processor, it is very easy to use, with extensive on-screen prompting.

SmartWRITER is brought up by pressing the WP/ESC key. Editing

and system commands are controlled by clearly labeled command keys, as well as the six "smart keys." The current function of the smart keys is displayed at all times at the bottom of the screen display. The excellent feel of the keyboard is supplemented by some clever audio feedback, part or all of which can be turned off by the user. (Note: to get sound from a monitor, a special cable is required.) The user also has a choice of two screen displays: a static screen that shows all text as typed, and a "moving window" screen that scrolls across the text, so that you can see how your text will look when it's printed.

I had no problem learning the system rapidly, and my wife—who is not an experienced computer user—was up and running within a half hour. We feel that *SmartWRITER* would be useful from the junior-high level and up, perhaps for even younger children who have some keyboard and computer experience.

SOFTWARE

Since a major component of ADAM is the highly popular ColecoVision system, Coleco game cartridges will be one of its prime attractions. Games will also be available on data packs. Because data packs can store larger programs than cartridges, many existing games will come in expanded versions.

To make Coleco a true family computer, however, Coleco needs to include educational packages as part of its software line. It says such packages are coming, including *Smart-LOGO*, *ADAM Typing Tutorial*, the *Homework Helpers* series, and *Story Factory*. In addition, several home-management packages have been promised.

BASIC PROGRAMMING

Coleco calls its version of BASIC SmartBASIC. What's smart about it is that it is very closely compatible with Applesoft BASIC, right down to the graphics (although ADAM has more colors in high-resolution mode) and storage commands. Thus, most Applesoft programs can be typed directly into the ADAM with only minor changes.

In addition, since one of the most popular computers in schools is the Apple II, students will be able to transfer their computer skills from one machine to another with a minimum of relearning. This somewhat offsets the lack of commercial software currently available for the ADAM.

My tests revealed that SmartBASIC is a fine beginner's language. Unlike Applesoft, program lines are

scanned for errors before they are accepted as part of a program. Error messages are very descriptive, even trying to indicate the location of an error in the line. There is a price for this assistance, however. The ADAM has 64K of RAM available for computing (16K is devoted to the video display, bringing the system total to 80K), but once SmartBASIC is loaded, only 26K is left over for programs and data. Those families with ambitious programmers will be haunting the computer stores, eagerly awaiting Coleco's promised 64K expansion.

MANUALS

The manuals supplied with the ADAM are excellent introductory materials. They are not especially elegant, to be sure, but the contents are



ADAM's keyboard is perhaps its strongest component. It has 75 keys plus a numeric keypad, and is easy to learn your way around and use.

well-written, using clear, nontechnical terms. Computer jargon is avoided or explained, and the tone is friendly and helpful. One glaring omission is the lack of explanation on what is needed to hook up a monitor. Another problem is that the manuals stop at the introductory level; the BASIC manual, in particular, does not explain many of the commands available to the user. Some users, of course, will never need to go further. But many others, particularly teenagers, will want to. Coleco should make allowances for this audience, and provide a technical manual that deals with the finer points of the ADAM's operation, particularly graphics. The current set has a tendency to leave off just as things are getting interesting.

A GOOD DEAL BUT FOR THE ACHILLES' HEEL

The ADAM system truly does offer a lot of value for the money. It is generally well designed and thought out. But, as with many pioneering ventures, early production may have bugs to work out. The most obvious problem here is the printer, with its light construction and startling noise level. If the printer will receive only light usage, or if you already own a ColecoVision, ADAM is an excellent choice for a home machine. **FC**

A PREVIEW:

IBM's PCjr

BIG BLUE ENTERS THE HOME AND EDUCATION MARKETS FOR THE FIRST TIME



The enhanced PCjr, with 128K memory, built-in disk drive, and 80-column screen display, costs \$1,269. The monitor and printer shown here are sold separately. (A TV may also be used, though it will not allow use of the 80-column screen display.) The PCjr entry model, with 64K, two cartridge slots (no disk drive), and a 40-column display, costs \$669.

IBM's long-awaited computer for the home and education markets, PCjr, was introduced by the company last November 1. While authorized IBM dealers should now be demonstrating the PCjr, actual shipments to stores will not begin until some unannounced date before the end of March. Thus, this is not a review based on hours of use with a production model; it is a preview of what to expect based on press information and two days of limited "hands-on" tryout.

The IBM PCjr, code-named "Peanut" during its development stage, represents a brave new step for the giant company known as Big Blue. IBM's name is known to most consumers because of the company's office typewriters and its preeminence in the mainframe computer field, where it developed a reputation as a reliable, service-oriented company. With its versatile new machine, IBM is trading on this reputation (and its marketing skills) to establish a beachhead in the school and home markets.

The PCjr is intended to be a computer for all seasons—for children to use both at home and at school, for people who want to bring work home from the office, and for parents. The

PCjr's manuals and built-in instructional programs are very colorful and simple—designed for novices who have been shipped into a new world and are looking for guideposts. Because of this and its expansion potential, the PCjr may be a meeting ground for both those who like the nightly national TV news and those who like Saturday morning cartoons.

AN IBM COMPUTER FAMILY

The PCjr comes in two models, both based on the same 16-bit microprocessor (Intel 8088) as the IBM Personal Computer, which has been such a success in the business market. Most computers in the PCjr's price range use eight-bit microprocessors, which run many programs more slowly and cannot address as much memory.

With the same microprocessor and a disk operating system similar to the IBM PC's, the PCjr joins a growing line of IBM personal computers that can "talk the same language." (This includes the IBM XT.) Many observers feel that this family of computers, positioned at different levels of the market, will give IBM a leadership role in microcomputers. Thus, most software developers and independent hardware manufacturers will proba-

PCjr FACTS

MEMORY: 64K RAM, expandable to 128K
USER-AVAILABLE MEMORY IN BASIC MODE: 44K
(for unexpanded model)

VIDEO DISPLAY: TV or monitor

TEXT DISPLAY: 40 char × 24 lines; 80 char
× 24 lines with 80-column card

GRAPHICS: 3 modes available: 16 colors,
160 × 200 resolution; 16 colors, 320
× 200 (128K required); 4 colors, 640
× 200 (128K)

SOUND: 3 voices

KEYBOARD: 62 rubber, unmarked keys

SUGGESTED RETAIL PRICE: \$669; for "enhanced" model with 128K, built-in disk drive, and 80-column card, \$1,269

bly back the PCjr with products, which may help create the industry standard both manufacturers and consumers have been waiting for.

Entry Model. The PCjr "entry" model, a \$669 package, includes a "system unit," containing the central processing unit, and a cordless infrared keyboard. This entry model has 64K of RAM and a 40-column screen display, and runs cartridge or cassette-tape programs. Users who want to store their own programs can do so with a cassette recorder. (The cassette cable costs \$30.) There is space in the system unit for a disk drive (\$480).

Enhanced Model. The enhanced model, selling for \$1,269, has the same infrared keyboard, a built-in disk drive, 128K memory, and an 80-column screen display (when used with a monitor). The disk drive accepts double-sided disks and can store 360K of information.

Keyboard. On both models, the keyboard uses an infrared transmitter powered by batteries, which can give signals to the system unit from up to 20 feet away. (An optional cord [\$20] can be used to hook up the keyboard.) The infrared keyboard operates much like a remote control channel-changer for TVs, with the signals

accepted by an "electronic eye" built into the system unit. The keyboard with batteries is extremely light, weighing 25 ounces, and can be easily carried around a room. IBM expects this feature will be useful in the classroom and at home.

IBM says each of the keyboard's 62 keys may be programmed individually, so that it can be "customized" for different uses. Because of this feature, the keys themselves are unmarked (the regular typewriter-style key designations lie behind each key, on the keyboard housing). Flat overlays that fit around the keys and lie on the housing can be marked with the customized key designations (five overlays cost \$10). And with some commercial programs, especially educational ones, overlays are part of the software package.

Because of this unusual keyboard design, and the fact that the keys are "Chiclet-style" and made of rubber, it is clear that IBM sees youngsters and those unaccustomed to regular keyboards as the primary users of the PCjr. Without preconceptions about how a keyboard should look or feel, they should adapt easily. But all types of users may find the PCjr's keyboard awkward for extended use, especially for those applications requiring extensive data entry, such as word processing, data-base, and spreadsheet work. But industry analysts expect that third-party manufacturers will soon come out with typewriter-style keyboards for PCjr.

Screen Display. Both PCjr models can be used with a TV (the connector cable costs \$30) or a monitor (adaptor costs \$20). The picture resolution on the entry model is very low (160h. x 200v.), about on a par with that of the VIC-20. When expanded to 128K, however, the resolution (640 x 200) is better than that of most microcomputers in its price range. The sacrifice for this high resolution is a reduction in the number of colors available, from 16 to four.

BASIC. IBM PCjr "cassette" BASIC is built into the computer's Read Only Memory (ROM). (PCjr's ROM, at 64K, is unusually large, which means the computer may have some very powerful capabilities yet to be experienced.) An extended version, the IBM "cartridge" BASIC (\$75), fits into one of the two cartridge slots and allows a user more programming options. For instance, cartridge BASIC allows the user to write a BASIC program that outputs three-voice sound.

Software. IBM announced four cartridge programs for the PCjr entry model. *Crossfire*, *Mine Shaft*, *Mouser*, and *ScubaVenture* are all action games, and each costs \$35.

Much more software will be initially available for the enhanced model. Most of these programs are education packages, including *Juggles' Butterfly*, *Bumble Games*, and *Bumble Plot* (all developed by The Learning Company), *Animation Creation*, *Monster Math*, *Adventures in Math*, and *Turtle Power* (IBM Logo). *Home Budget, jr.*, a reduced version of the *Home Budget* program available for the IBM PC, and *HomeWord*, an easy-to-learn word-processing program with pictures (from Sierra On-Line), were also introduced.

Some high-powered business programs that run on the PC will also



Keyboards in contrast: The IBM PC keyboard (top) has 83 keys, which make a gratifying click when pushed; the PCjr keyboard has 62 keys, and a less professional feel.

run on the enhanced PCjr. These include the spreadsheet programs *Multiplan* and *VisiCalc*, the word-processing programs *EasyWriter 1.15* and *PeachText*, and two programs from the PFS family, *PFS: File* and *PFS: Report*. And the new *Personal Communications Manager* software, to be used with a modem for telecommunications, will run on both the PC and enhanced PCjr. In short, any program that can run on a 128K PC with one disk drive can theoretically run on the enhanced PCjr.

Peripherals. IBM will market a variety of peripherals for the PCjr, and third-party manufacturers are certain to add more.

The IBM PCjr Internal Modem (300 baud, \$199), a circuit board that fits inside the system unit, allows you to plug your phone jack directly into the back of the PCjr system unit. External modems may be hooked into the PCjr's serial port, with a \$25 cable.

The IBM PC Compact Printer (\$175, plus \$40 for an adaptor), a lightweight thermal that prints 50 characters per second, connects to the serial port. IBM's expansion attachment (\$99) will allow use of printers with parallel interfaces. This same attachment, a thin piece that

fits on one side of the system unit, could also be made to accept a second disk drive or other peripherals that third-party manufacturers are expected to market.

The IBM PCjr Joystick (\$40) can be connected to the back of the system unit. There are two joystick ports and a port for a light pen.

On the back of the PCjr system unit there is a port labeled "L". IBM representatives at the product introduction, many of whom had been involved in product development, said this meant "L for later." Many observers believe that "L" stands for Laser, and think that users in the future may be able to connect a laser-oriented videodisk system.

PRE-RELEASE REVIEW

Early reviews of the PCjr are of three minds. Some think it represents "ho-hum technology"; others think it's "priced double what it's worth"; and others think it's the most powerful computer in its price range available to home users. Our assessment falls between.

At first look, we think the enhanced version of PCjr (128K, with built-in 360K disk drive, for \$1,269) is a "lot of bang for the buck," but we feel that the entry model (64K, no disk drive, \$669) offers less than the Commodore 64 and Atari 800XL, which are priced considerably lower. The PCjr doesn't have the color capability of the Atari 800, the sound capability of the Commodore 64, or as sharp a screen display as either. Moreover, both the Atari and Commodore keyboards are more like conventional typewriter keyboards than the PCjr's, though this should not matter much to children or casual adult users.

Nonetheless, there are two advantages to the PCjr entry model. One can be summed up in three letters: IBM. When it comes to service and backup, neither Atari nor Commodore can match IBM's record, even though it was set in the business, not consumer, marketplace. And Atari's and Commodore's lead in software probably won't last for long—every software developer is chomping at the bit to get a PCjr package on the market. Second, the PCjr can be expanded into a very powerful computer.

In short, if you want stability and service over the long run, and think you will eventually want to run software requiring 128K, the extra money you pay for the PCjr entry model may be worth it. And, if you can afford the price, the PCjr enhanced model looks right now to be a lot of computer for the money. **E**

—THE EDITORS OF FAMILY COMPUTING

Let's Be Friends

THE DIARY OF A FAMILY'S FIRST DAY WITH ITS COMPUTER

BY ROBIN RASKIN

Robin Raskin is an experienced computer user and writer—and a parent. To help answer the questions from all the people who ask, "Now what do we do with our computer?" she's written this fictionalized, first-person account about the first 24 hours of owning a home computer.

Buying our computer and bringing it home—at last—was a series of ups and downs. The first several hours are vital if you want to get on the right track of family computing from the start. Here's how things went for us.

COMING HOME

Friday—10 p.m.: We were a typical precomputing family. We did our research; pinpointed our family's goals and expectations; annoyed friends with endless computer conversations; gave the salesperson an Excedrin headache; and now—finally—were driving home with our new computer.

My husband, Joe, parks the car in the driveway. Holding his breath, he lets the kids—Sean, three; Jenny, eight; Kari, ten; and Ken, twelve—help unload the boxes. Once maneuvered inside, the boxes are restacked on the living room floor. There it is—our own computer! The family trembles with excitement, looking at our personal invitation to the Information Age resting right in the middle of the living room.

Joe is tempted to rip open the boxes, dive in, and make it all worthwhile by playing his first game of *Pac-Man*, but he controls the impulse. (Good thinking! If he had followed temptation, he would have been on the road to computer frustration. Waiting until morning, when

we could carefully set up the machine, meant that our first hours with the new computer paved the way for future accomplishment.)

Patiently, but firmly, Joe reminds the kids that "tomorrow is another day," and that the last one to bed will be last to try *Defenders*.

11:00 p.m.: Tin Tin, our territorial dog, settles down with his snout on the box of software. All's well.

MAKING THE RIGHT SPACE

Saturday—6:00 a.m.: Groaning, I awaken to the sound of the tearing of cardboard boxes. Reaching for my robe, I get ready to enter the living room, where I come upon a Christmas-morning look-alike contest. Tin Tin has nosed into the warranties; Styrofoam chips cover the floor; and three-year-old Sean is energetically trying to shove the plug of the soon-to-be computer into an outlet. I decide rapidly that it's time to assume command.

I recognize that using the living room floor as a work space, even temporarily, could lead to disaster. So I organize a task force to convert the cluttered desktop in the family room into a home for the computer.

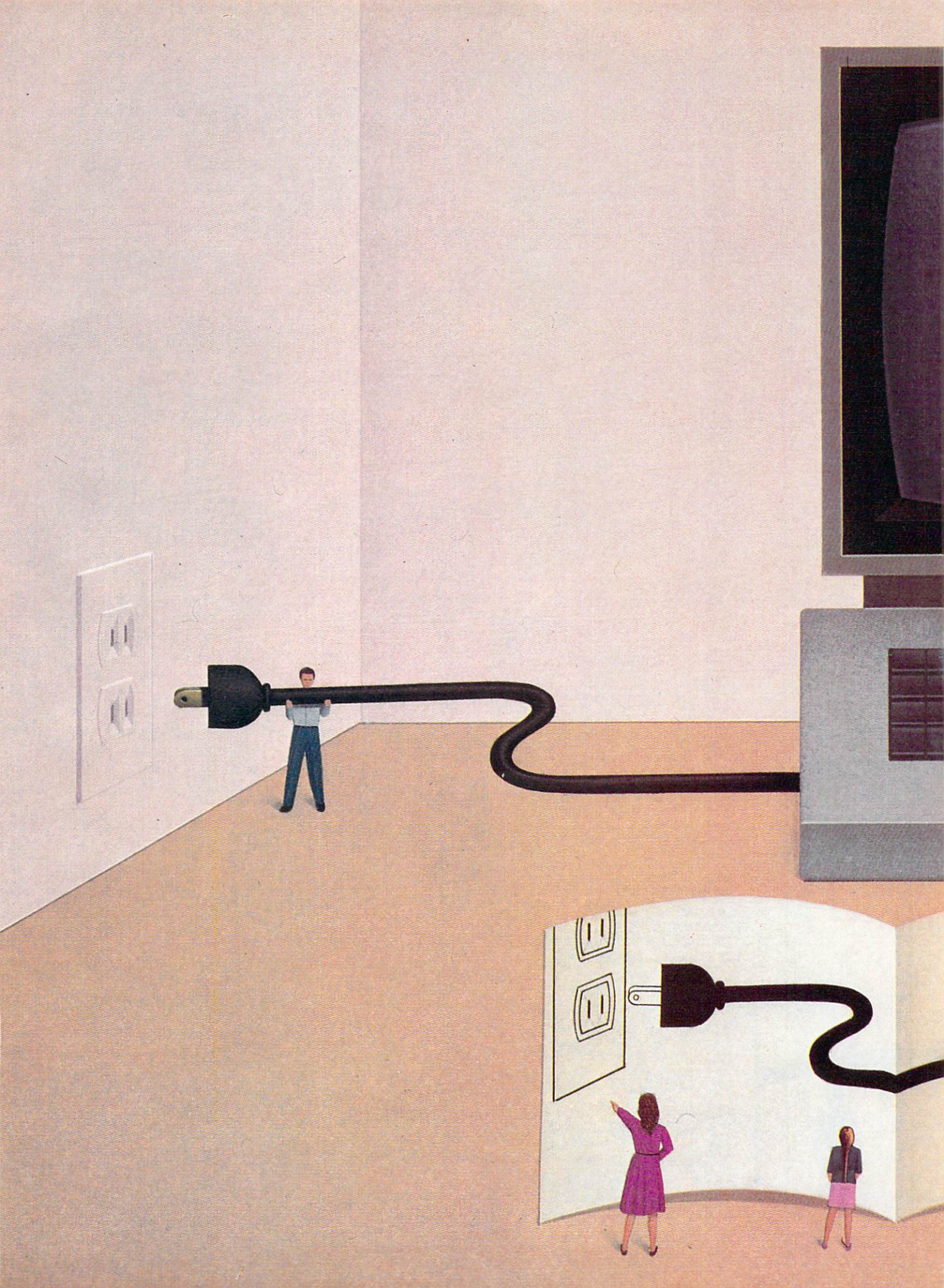
The family computer space turns out to be perfect. It is neat, kept at normal room temperature, and has adequate storage room for all the disks, cartridges, and manuals. The monitor can be positioned to minimize glare, and the computer has its own electrical outlet, free of the voltage demands of the vacuum cleaner or stereo.

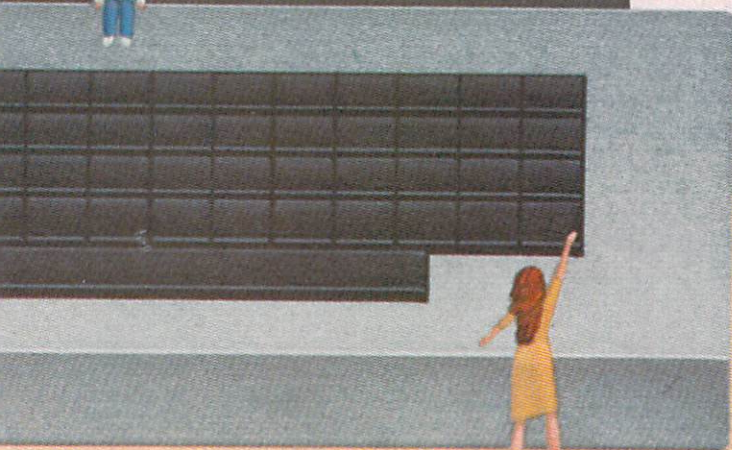
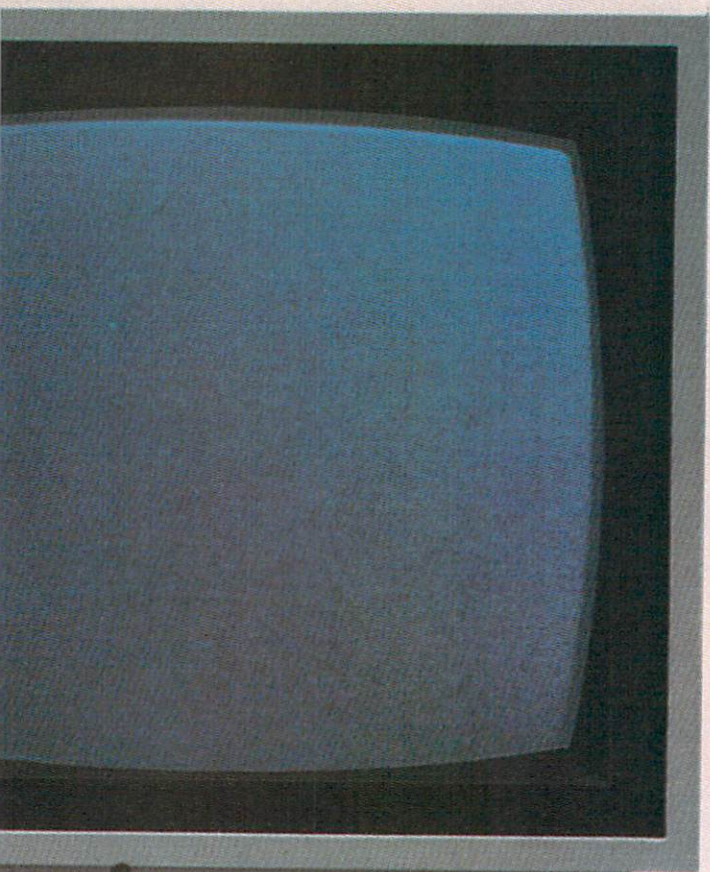
7:00 a.m.: We all go to the kitchen for breakfast to avoid "feeding" the computer.

[Although many home computers are

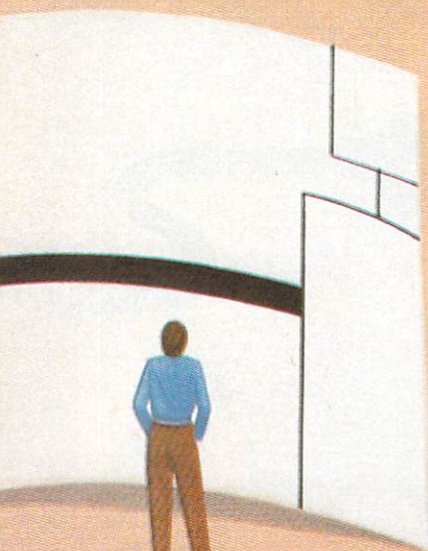
**"SETTING UP
OUR HOME
COMPUTER HAD
ITS SHARE OF
COMIC RELIEF
AND NOT-SO-
COMIC ERROR."**

ROBIN RASKIN works as a technical writer for a computer consulting firm in New York and is currently coauthoring a book on computer applications.





MONTIEL



"USING A COMPUTER SHOULD ALWAYS BE EASIER THAN NOT USING A COMPUTER"

THEODORE NELSON,
AUTHOR OF COMPUTER LIB

somewhat kid-proofed and resistant to permanent damage from such things as ice cream drips and orange juice spills, prolonged exposure to gastronomic delights can cause undue wear and tear on the system.]

GETTING IT ALL TOGETHER

7:30 a.m.: After breakfast we go back to our newly cleared computing space and begin the assembly process:

1. Joe carefully unpacks each of the boxes. He asks every member of the family to *identify* each piece of equipment. Because he's the last to learn to distinguish the disk drive from the printer, he gets to do the breakfast dishes. The rest of the family continues with the assembly process.

2. I check the equipment for such obvious shipping and packing damage as cracks, chipped plastic, and broken or frayed wires.

3. Kari makes a final check to make sure that the pieces are compatible with each other.

4. Sean and Jenny put all the boxes and packing materials in the attic—just in case we have to return an item for servicing.

5. Ken organizes the new acquisitions into three piles: software, hardware, and accessories. He sorts out extra disks, printer paper, printer ribbons, and extra wires and cords, which are included with the system but are not needed at this point. Ken then gives the family a quick lesson on the difference between software and hardware. He has gained his knowledge by reading some introductory computer books. By the time Ken's lecture is over, even Sean can recognize that a disk is the "thing" that has the game or program on it and that the "machine" is the computer itself.

8:00 a.m.: Kari asks if it's OK to call her friend, Tina Randall, who has the same kind of computer. I wearily reply that it's too early. Joe gives Kari the computer operations and assembly manual to read—carefully.

8:15 a.m.: Ken reads, fills out, stamps, and mails all of the manufacturer's warranty cards. Joe posts a list of emergency numbers on the wall above the computer. The list includes the service numbers for the factories and repair services, and the manufacturer's hotline number for pressing questions.

(Our past experiences with radios, stereos, CBs, and other wonders of the modern age have taught us well. Fill out warranties and understand all guarantees, and you'll have fewer worries. Computers are complex electronic

instruments. Immediate attention to the warranties and guarantees protects you against being stuck with defective equipment.)

8:30 a.m.: Tina Randall calls to ask Kari if she has her new computer yet. Tina says she and her older brother, Allen, will come over in the afternoon for the launch.

Without telling any of us, Joe had asked Ruth Bixby, a neighbor and electrical engineer, to come over, too. She doesn't have a home computer, but Joe figured having a mechanically inclined person around couldn't hurt.

MAKING THE MOST OF THE MANUAL

9:00 a.m.: Having identified the computer, disk drives, and printer, it's time to let Kari show off what she's learned about computer assembly from the manual. Running the computer depends on Kari's translation of the manual. "This manual is terrific," Kari exclaims. "Great cartoons!"

(Like computers, computer manuals have come a long way. The first ones were highly technical and filled with jargon. Most of today's manuals are friendly and helpful, and written in nontechnical terms.)

Kari interrupts herself to tell us the story of Tina's beautiful Logo graphics. Once, when Tina created a drawing she really loved, she accidentally erased it before she saved it.

"Tragic story," says Joe. "What's the point?"

"The point," Kari answers, "is that Tina told me not to do anything before reading a whole section of the manual. Tina says that lots of times the silly manuals tell you what you need to know a long time *after* you need to know it, so you better know it first."

9:30 a.m.: Using the manual, Joe installs the switch box that converts the TV in the family room into a display screen for the computer. Jenny grumbles, "What about The Fonz? I didn't know we couldn't watch TV if we had a computer!"

Joe looks up from detaching the TV antenna and attaching the computer console to the TV just long enough to mutter something about spending the extra \$200 to get a computer monitor. I nod dreamily, thinking that the whirring of disks will sound heavenly compared to "Happy Days" reruns.

Next, Joe follows Kari's instructions to attach the peripherals to the computer. After he attaches the disk drive according to her specifications, he suggests we turn on the computer and see what it can do. Everyone eagerly agrees.

(Since we purchased our entire system from one manufacturer, we had an easy time connecting all the elements. But if you've pieced together your system from different manufacturers' components, this step might require more time-consuming customizing.)

9:45 a.m.: Under my supervision, Sean is al-

**IMMEDIATE
ATTENTION TO
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EQUIPMENT.**

lowed to help plug in the power cord. The unused outlets all have child-proof covers. (Joe followed the salesperson's advice and bought a power strip to keep the stray cords and wires to a minimum.)

LIGHTS! ACTION??

Ken turns on the computer. The screen is absolutely blank. "I knew it!" cries Joe, "It's broken."

I calmly suggest, "Check all those wires you connected, dear." Sure enough, the wire from the power adapter to the console was not attached securely. Ken's next try is successful.

"Great! now what do we do?" asks Ken. "All that's there is a blinking light."

Kari: "Stop it, Ken! I'm reading as fast as I can."

Me: "Oh look! The cursor is changing colors! Is that all right? Is it breaking?"

Kari: "Oh, that's explained in the manual! The changing colors of the cursor—that's to protect your TV from burning out its color tube. Anything left on the screen will change color after you've left it there for a few minutes."

Ken: "Great, you can break for a snack and get right back to it."

Joe: "I don't know, Ken, I'll bet you can lose information pretty quickly. All Sean has to do is come play 'type-type' while you're snacking, and you'll probably get some weird results."

Ken: "I can see your point, Dad."

10:00 a.m.: I'm the first one to sit at the keyboard. "It looks like a fancy souped-up typewriter," I comment, nervously clearing my throat and stretching my fingers like a professional pianist.

Kari points out that certain keys will type in characters, and other keys, such as the DELETE and INSERT keys, handle screen editing. Still other keys, such as graphics keys and the RESTART key, initiate special functions. Joe decides to photocopy the page in the manual that identifies the function of the keys on the keyboard and post it up by the computer alongside the emergency phone numbers. I finger the keys of the keyboard one by one to make sure they operate properly. (Caution: A sticky key can be annoying, especially for budding young word processors.)

"Watch this," I gloat. I type *COMPUTERS ARE FUN* faster than Ken can say *Missile Command*. The television screen displays the sentence. I say, "You should all learn how to type well enough so that what you see on your display screen is what you want as input into the computer. Computers aren't too tolerant of sloppy typists—at least that's what Tina's mother told me."

CARTRIDGE CARE

10:20 a.m.: Joe appears with a box of magnetic disks. "These things really cost a lot," he lectures, "so take good care of them! Here's a pencil. Everyone take one of these floppy disks

and write their name on the label of their disk."

"No, Dad!" says Ken. "Look at this book." Ken waves his popular beginner's guide to computer literacy again, saying: "Pencils are no good, they'll hurt the disk. We should use felt-tip markers. Furthermore," Ken clears his throat, "we can't keep disks in the sunlight, bend them, get them wet, or use paper clips on them. We should always return them to their paper sleeves after using them, handle them only by their protective coverings, and never store them near the TV set or near any other magnetic or electric current. We better get our act together!"

10:50 a.m.: Kari: "Remember, our computer is different from the one we all tried at Kozy Computers. We need to insert this cartridge to get the machine to do anything. Dad, where's the BASIC cartridge?"

11:05 a.m.: Joe locates the correct cartridge buried under *Alphabet Gardens*, *Combat Zone*, *Plato's Search for Truth*, *Kitchen Organizer*, and *Tax Manager*. He decides then and there that the cartridges should all be placed in a large drawer in their correct packages as soon as someone's finished using them. He also prominently displays the disk storage box. "Whoever doesn't return their disk properly to this container is going to have to enter all my expenses for the *Family Budgeting Program*. Got that straight?"

11:15 a.m.: Jenny tries to insert the cartridge upside down.

11:20 a.m.: Kari gets the cartridge in correctly, but fails to get anything on the screen.

11:25 a.m.: Joe reads the manual and discovers that the machine needs to be shut down and turned on again to "reboot" the system. Finally, he sees the letters OK appear on the screen.

"OK what?" I ask.

"OK, this is BASIC," Joe replies. "I'm going to try something." He looks a little scared.

"Wow, you're brave," says Jenny.

Sean puts a sticky finger on the blinking cursor with delight. "That reminds me," I say. "I have some glass cleaner and rags set aside. We'll keep them in this closet along with a little surprise I dreamed up (I fling the closet door open)—our very own computer work wheel." (Groans and moans from the crowd.) "Once a week someone will clean the screen, dump the wastebasket, take an inventory of printer paper, ribbons, etc., and tidy the disks and cartridges. Tina's mother told me she was once looking for her favorite eggplant recipe but her recipe file had been misfiled and all she could find were John's science papers. It won't happen here!"

FROM FIEND TO FRIEND

11:40 a.m.: Joe now sits in front of the computer and types:

**"ONCE A WEEK
SOMEONE WILL
CLEAN THE
SCREEN, DUMP
THE
WASTEBASKET,
TAKE AN
INVENTORY OF
PRINTER PAPER
AND RIBBONS,
AND TIDY THE
DISKS AND
CARTRIDGES."**

10 PRINT LET'S BE FIENDS
20 GO TO 10
30 END

"This is it," he says tentatively.

"Dad," interrupts Kari.

"Quiet, Kari, I'm thinking."

"Dad don't you mean *friends*?"

"That's what I typed, 'Let's be friends.'"

"Look again, Dad, you have f-i-e-n-d-s."

"I guess I do at that. Well, I think I can get the cursor back there and insert the R in 'fiends.'"

12:00 noon: With Kari and Ken's aid, Joe finally succeeds in manipulating the cursor and inserting the "R" in the correct place. "I can see why you might want to hone your typing skills and really get the cursor movements down pat," Joe says.

12:05 p.m.: Now Joe types RUN and the screen is instantly filled with the terrifying message: SYNTAX ERROR. "Oh, no," says a petrified Joe. "Now what have I done? Check the manual, Kari. I'm wrecking our computer."

12:20 p.m.: Kari discovers that all PRINT commands for typing text must be enclosed in quotation marks. Joe could try to insert the quotation marks around his words, but moving the cursor makes him weary. Kari suggests he simply retype the entire line. He starts again with:
10 PRINT "LET'S BE FRIENDS"

This line will replace the previous line 10.

12:30 p.m.: Joe looks pale as he types in RUN again. The screen instantly is filled with rows of LET'S BE FRIENDS. Proud as he is of himself for having executed a simple BASIC program, Joe wishes he could figure out how to stop the never-ending loop he's created. No dice. He panics and swears he'll never write those words again.

1:00 p.m.: After a half hour of watching LET'S BE FRIENDS run again and again, no one is feeling especially friendly. We turn off the computer. Lunch and a 30-minute moratorium on computer conversations perk up everyone's spirits.

GAME TIME

1:30 p.m.: The doorbell rings. The Randall kids and Ruth Bixby have arrived to see the new computing family. Time to go back to work!

1:45 p.m.: Allen Randall suggests we play a disk-based adventure game, called *Ulysses and the Golden Fleece*. Ken selected that game at the computer store when each family member got to choose a piece of personal software. Ken immediately inserts the disk into the disk drive, but Allen says, "Wait!."

"Huh?"

"Backups! You gotta have backups. You paid \$30 for this disk didn't you?"

Joe nods vigorously.

"Then you ought to back-up the disk by

copying its contents onto one of your own. That way you'll use your backup to play with and save the original from harm." (Some software is protected by copyright law, and making copies may be illegal. However, some manufacturers allow users to make backup copies for their own protection. With *Ulysses*, for example, the software comes on both sides of a disk. The first side is for loading the game; the second side is used while you play the game. The first side is copy-protected, but you can back-up the second side. Check the manual for each program; it should specify whether or not material may be copied.)

2:00 p.m.: Allen initializes Ken's backup disk using the DOS operating system manual procedure, and then he makes a backup copy of the game. He also gives Ken an initialized disk to record his own progress on the game, since *Ulysses* is one of those games that can take anywhere from six months to a lifetime to complete.

2:30 p.m.: We find ourselves trapped in the cave of fire and decide to call it quits. We use Ken's disk to record the progress of our game thus far and vow that next Friday night, we'll get together to play again. I suggest we let Sean have a turn at an alphabet game. Each time Sean presses a letter, a big beautiful graphic appears on the screen. Everyone enjoys relearning the alphabet with Sean because the graphics and sound effects are spectacular.

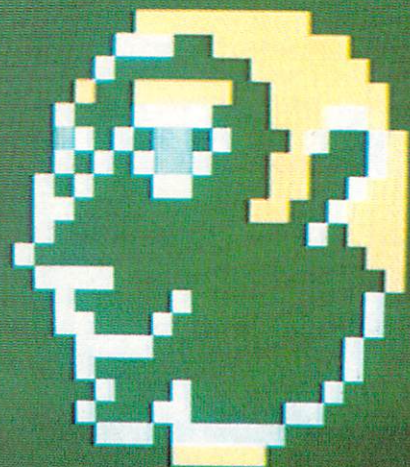
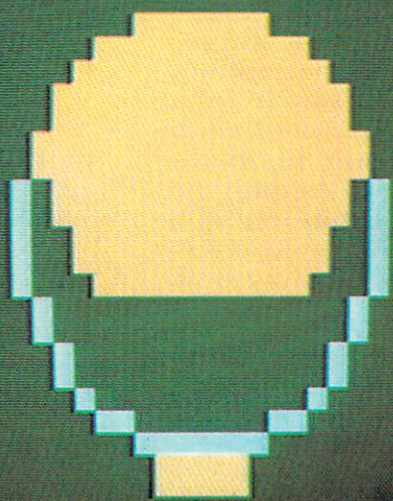
NEW HORIZONS

3:00 p.m.: Sean settles down to nap. Joe sets up his personal file-management system with the aid of Allen and Ruth. Ken is in his room outlining the social studies paper he wants to write with the word-processing package. I'm in the kitchen thinking about how to organize our bills for a budgeting program. Kari and Jenny circle their father, waiting to try *Ms. Pac-Man*. But before he lets them play, he types in his special sentence again. LET'S BE FRIENDS lights up the monitor.

An air of tranquil high-tech harmony fills the household. We decide to set aside a time each week to share our individual triumphs and tragedies with the computer. I think I'll investigate software exchanges and modem services to cut the cost of purchasing new software. Ken has volunteered to join a local users' group and report to our family. Jenny and Kari are going to research available publications and come up with a list the family will find useful and informative.

For us, setting up the home computer had its share of comic relief and not-so-comic error. But, hours after being almost completely ignorant of how to run a computer, we are merrily computing away. We acquired some fundamental computer skills in a very short time. From now on we will polish and refine our skills with each computer adventure. **FC**

"WE DECIDE TO SET ASIDE A TIME EACH WEEK TO SHARE OUR INDIVIDUAL TRIUMPHS AND TRAGEDIES WITH THE COMPUTER."



Portrait of an Artist as a Software Rebel

AN INTERVIEW WITH GUY NOURI,
CO-DESIGNER OF THE GROUND-BREAKING
PAINT AND MOVIE MAKER

BY NICK SULLIVAN

Guy Nouri, a 31-year-old artist who started out painting with oil on canvas, now uses cursors, joysticks, and Atari computers as his media. Paint, the first program he designed (at the Capital Children's Museum) with Eric Podietz, his partner and programmer, made full use of Atari's 128-color capability. With Paint, you can choose from more than 70 brushstroke and various stylistic (circle, line, etc.) modes to draw a painting on a computer screen. One- or two-keystroke commands allow you to jump from mode to mode. The simplicity of the program allows you to concentrate on "painting" the empty canvas/screen in front of you.

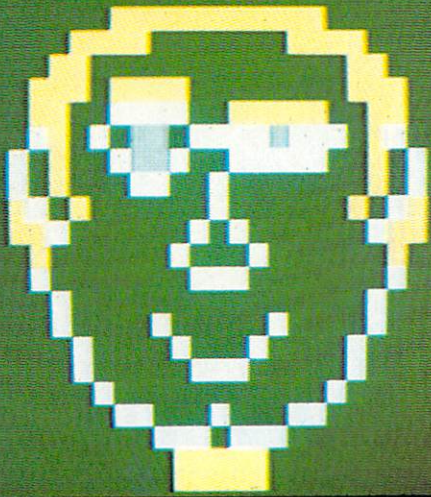
Because Paint was published in 1982 (by Reston Software), when shoot-'em-up games ruled home and video parlors and the big marketing bucks, Paint attracted no more attention than a good French movie. Though

some people bought Atari computers to run Paint and others talked about it (as they still do), it never hit the charts. In marketing lingo Paint was a word-of-mouth hit, a good first novel. But no Pac-Man.

Now, Nouri's company, four-year-old Interactive Picture Systems, has grown into IPS Inc., with 11 full-time employees. And it has produced a fitting sequel—Movie Maker.

Movie Maker, also from Reston, is Paint gone-to-the-movies. It presents 64 shapes from which you can create six simultaneous on-screen characters, and allows you to choose tints from a palette of 128 colors; add four-channel musical effects selected from drum, whistle, zap, zoom, and chug-a-chug sounds; write in some text; and then roll all these elements into a five-minute animated sequence. You can edit the composition with fast forward, rewind, and single-frame step

NICK SULLIVAN is the features editor of FAMILY COMPUTING. In our October issue, he profiled Andrew Greenberg, designer of Wizardry.



mechanisms, and focus on minute details with a three-level zoom feature.

Movie Maker provides "real-time animation," which means the animation reels as you punch the keyboard or twiddle the joystick. The effects might not be as startling as a Disney reel or a Saturday morning cartoon. But you can, in effect, turn your computer into a Polaroid-style movie camera. That is something new, and the initial response proves it.

An advanced version of the program, Movie Maker Professional, has been donated to New York University's Alternative Media Center, where it is used as a teaching device, and San Francisco's Exploratorium Museum, where it will be used to create animated exhibits. The Motion Picture Screen Cartoonists Union, Local 841, with funding from the New York City Board of Education, is using Movie Maker to help prepare its members for future job opportunities in computer animation.

Movie Maker Professional, which is hand-tailored for individual clients, is being licensed by companies that want to create and see quick animation sequences before doing the programming or filming needed for the finished product. Licensing allows them to use the program commercially and to sell the animation they create.

IPS Inc. has four other new releases: *Aerobics*, *Dance*, *Trains*, and *Gramma's House*, all published by Spinnaker Software.

[Movie Maker costs \$65 and runs on a 48K Atari. Future versions will run on a 64K Apple, an IBM PC, and a Commodore 64. See accompanying review.]

FC: When and how did you turn from an artist into a software designer?

Nouri: I'm a painter, and I did *Paint*. Then I wanted to see images that moved, and I did *Movie Maker*. I still paint abstract things in oil,

just as I have since I was 13. But when I was a fine arts major at Princeton, I took some computer graphics courses and started playing around with a mainframe computer. I discovered a whole new world of image making.

After college I cofounded and was editor of a magazine called *Computer Pictures*. Later, I was approached by the Capital Children's Museum to put together a software package on painting. After working four months of 18-hour days and seven-day weeks with Eric Po-dietz, the program that resulted was *Paint*.

FC: And the next logical step was to do a program that allowed people to animate the images they made?

Nouri: Well, yes, but it wasn't quite that easy. When people asked what I was going to do next, I said, "An animation program." They all said it was impossible; that even on a mainframe there were limits; and that on a 48K microcomputer you couldn't animate more than 10 screens—or frames, to put it in movie-making terms—at once.

FC: So how did you get around this technological limitation?

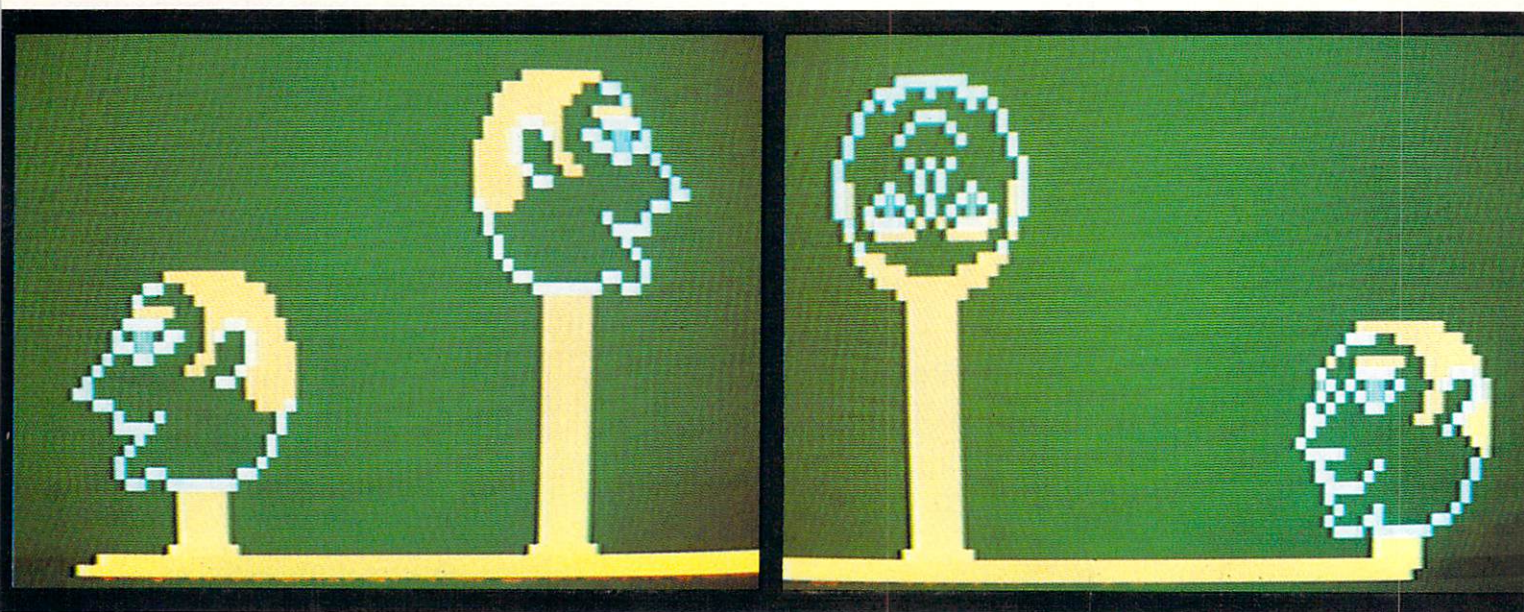
Nouri: We came up with a scheme, based on "cel" animation. Our process, which we are trying to patent, is a secret.

FC: Any clues?

Nouri: It's similar in some ways to the process Walt Disney used to create his animation. In Disney-style animation, individual, transparent frames are actually hand-painted, then photographed in succession, to give the illusion of movement. Basically, *Movie Maker* allows people to "color" their own frames and then animate them.

Guy Nouri, president of IPS Inc. and co-designer of *Movie Maker*. The screen shots, which continue on the next two pages, were taken from an animated 3D computer portrait designed with *Movie Maker*.

"WE WENT OVERBOARD. WE WANTED TO CREATE A LANDMARK."



**"I DON'T
SUBSCRIBE TO
THE COMPUTER
INDUSTRY'S
MAXIM THAT
EVERYTHING
SHOULD BE
INCOMPATIBLE
WITH
EVERYTHING
ELSE."**

With the conventional computer animation technique, called "full screen" animation, you rarely see more than one or two actors moving on the screen at once. The same with Saturday morning cartoons. With our version of cel animation, we've made it so the user can create up to six shapes and a background.

FC: I'm a little lost. There must be more to your scheme.

Nouri: There are two other parts. One is animation compression, which means that we've found a very efficient way of compressing the program code to make it fit on a 48K computer. Instead of 10 frames, we can animate 300 frames at once. This results in sequences of a minute or more, depending on how fast you run them.

Second, instead of trying to do the animation in one fell swoop, we've divided the process into five separate programs: *Compose*, *Record*, *Smooth*, *Play*, and *AutoPlay*. Only one of these programs is loaded into the computer at once; again, this is a way of making efficient use of the available memory.

FC: Is the process of drawing characters in *Movie Maker* similar to drawing images in *Paint*?

Nouri: The *Movie Maker* program is different, a next step. For one thing, it's kinetic, it moves. And, instead of a brush, you create with a pen, which is a pixel. The idea is to create actors, not backgrounds. We give you 64 shapes to select and combine; and you have a window on the screen that allows you to pick up and place and even duplicate these shapes.

For example, you can pick up a head from a dog and put it on a cat; or you can split a tree in half; you can duplicate a tree and make a jungle.

But in use the program's much the same as *Paint*. You can switch from mode to mode (such as line, circle, fill, etc.) in *Movie Maker* without having the computer honk at you. I hate programs that honk at you.

FC: Can you load *Paint* drawings saved on a disk into *Movie Maker* and animate them?

Nouri: Yes. *Paint* is compatible and can be used as a background for your animated characters. You can also write your own program, using the graphics mode accessible in Atari BASIC, and load those pictures into *Movie Maker*. I don't subscribe to the computer industry's maxim that everything should be incompatible with everything else. If anything, *Movie Maker* is too flexible.

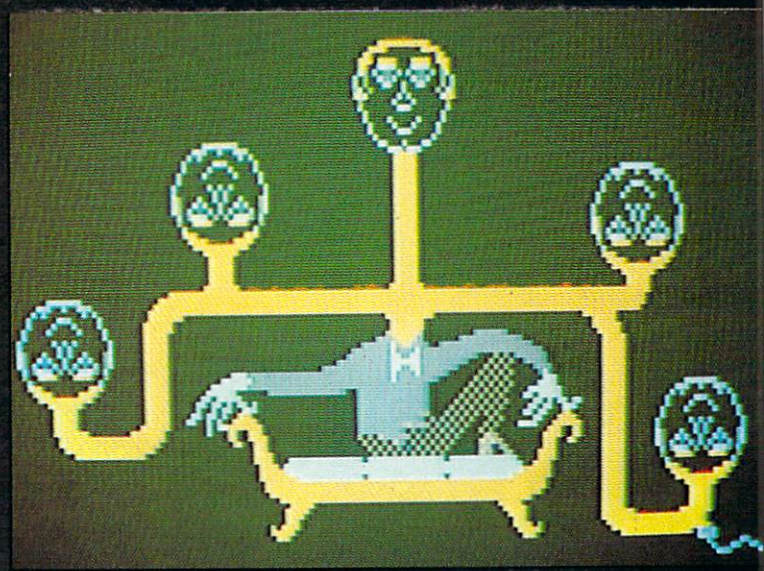
FC: What do you mean by that?

Nouri: You'll never see a *Movie Maker* 3. We designed an intelligent program, with depth, that can do a lot of things. You can change color while zooming and animating. People aren't used to doing things simultaneously. When you get everything going at once it gets very fast and wild—it leaves other software behind. We went overboard; we wanted to create a landmark.

FC: It seems that a graphics tablet would be ideally suited for *Movie Maker*.

Nouri: I agree. We're now making it so that the X function, which allows you to load the Atari character set and other special effects, will accept a graphics tablet. But you can still operate it well with a \$10 joystick. That's how we designed it.

FC: What's the difference between painting on canvas and painting on a computer?



Nouri: On a computer you're dealing with a different kind of space, an abstract space. You can't feel it, but can explore it with your mind. As an abstract painter, this is what attracted me to computers in the first place. You also have an element of time to play with, especially on *Movie Maker*.

FC: Why does the rest of Interactive Picture Systems (a group of 11 artists, programmers, and specialists) work out of Philadelphia, while you work out of your New York apartment?

Nouri: Some of them come from the area, and they like Philadelphia. Also, New York's too hectic an environment for concentrated programming. But we're a tight group. Every once in a while we go on week-long retreats together to hammer out new programs.

FC: Describe how IPS works, from concept to finished product.

Nouri: When we get an idea we like, we take it to a publisher. Because we have a good track record, we usually sign a contract at that point. *Movie Maker* was a bit different, due to its complexity. We worked for six months before coming up with our scheme and getting a contract.

Once we get a contract, we do a detailed proposal, which includes a "state diagram," and present it to the publisher.

FC: Is a state diagram like a flow chart?

Nouri: It's similar to a flow chart, but has another feature. Instead of just charting the structure of the program code, we also outline what each part of the program will allow the user to do—and how it will respond to whatever the user does. Since it's our aim to produce "user-stupid" software that anybody can use,

this is very important. This phrase doesn't mean that the user is stupid, but that the program must be intelligent enough to handle anything. A lot of so-called user-friendly software turns out to be "silly" software. It can't do anything.

As an example of what might go into a state diagram, *Movie Maker* is a completely visual system. From the user's point of view, it's not hung together by programming sequences, but by visuals—and that would be indicated.

FC: Do you consult with specialists in a field when you're doing, say, an animation program? If so, at what point in the development process does this happen?

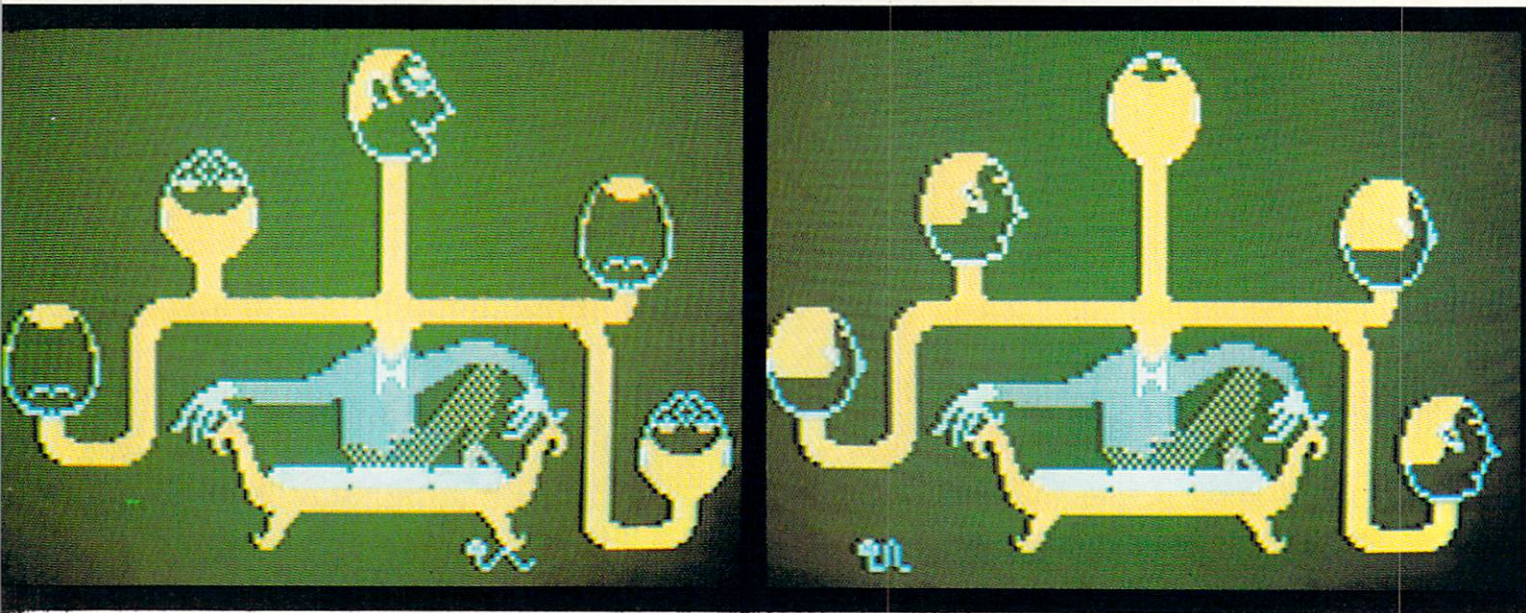
Nouri: We do consult with outside specialists when needed. For *Movie Maker*, we relied primarily on Bob Svihovec, an IPS animator who designed the shape page and did the demo animations (on the flip side of the program disk). We also talked with 20 or 30 animation consultants, and tested the program with the Screen Cartoonists Union.

For *Aerobics*, one of our new programs, we consulted with dancers from the Joffrey Ballet; for *Dance*, with [modern dance great] Merce Cunningham. This consulting is done before we write our detailed proposal, so any ideas can be incorporated.

FC: What is your actual role in all this? Do you do any programming?

Nouri: I don't write any of the programs, though I can program a bit. Eric, Jimmy Snyder, and Mark Scott do the programming. My main job is to design the program—in conjunction with Eric, my partner, and the senior programmer—and then see to it that the programmers, musicians, artists, and contents

"YOU CAN PICK UP A HEAD FROM A DOG AND PUT IT ON A CAT; YOU CAN SPLIT A TREE IN HALF; YOU CAN DUPLICATE A TREE AND MAKE A JUNGLE."



**"WE'RE
SOFTWARE
GUERRILLAS,
TRYING TO GET
RID OF THE
JUNK, AND
REPLACE IT."**

specialists all work together toward a finished product. I'm the one who orchestrates. But we're a team.

FC: Sounds much like the role of a movie producer.

Nouri: Yes, pretty much. It's funny, I've ended up in a different side of the business than my brother, Michael [star of *Flashdance* and NBC's "Bay City Blues"]. In the genes, I guess.

FC: What's it like dealing with software publishers?

Nouri: You have to stay in constant communication. If a developer calls a publisher and leaves a message, he'd better call back in five minutes. We need the response. Publishers seem to think that once they sign a deal the software's going to appear magically. But software takes talk.

FC: And they don't understand that?

Nouri: It's very risky for publishers now. They're jumping into a very hot market, usually with products like what's already on the market, and are understandably nervous.

To give an example: I've talked to publishers about certain projects, and I tell them that development will take 12 to 24 months. They say 'Okay.' Fifteen minutes later they come back and say, 'We need it in four months. We've got to get it out there.'

They're worried partly because they think there's going to be a whole new generation of computers on the market in two years. But adapting a program for a new computer takes a month, or two months, tops. Writing the program in the first place is what takes time. Four people worked 18 months, or six man-years, to make *Movie Maker*. Adapting it for the Apple

and Commodore and IBM will only take a few months.

FC: What do you think of the software on the market now?

Nouri: I call it the "software swamp." Anyone who can write a program is writing a program. And a lot of them are getting published.

I think the audience is maturing faster than the software. It's getting to the point where experienced kids and adults are both looking for the activity-oriented software. People want to relax and create, rather than just play games.

FC: How would you characterize yourself, or IPS, in relation to the software swamp?

Nouri: We're trying to create software that people can enjoy. They shouldn't have to slave away at their computers. And we're not aiming at a narrow market. Young and old, to put it simply.

We're software guerrillas, trying to get rid of the junk, and replace it. The Boston Tea Party rebels did that, and built something. And with all this new technology, there's a good chance to build a new kind of country.

FC: Is there any software you like?

Nouri: I like the stuff Bill Budge [designer of *Pinball Construction Set*] has done. I like the Learning Company [*Rocky's Boots*]. And I like *FaceMaker* [Spinnaker Software]. It deserves a lot more credit than it's received. I was very disappointed when I first saw it; I wished I had done it.

FC: Do you doodle?

Nouri: I dream. I dream a lot. **FC**

LIGHTS . . . CAMERA . . . ACTION!

A Review of *Movie Maker*

If you ever wanted to be a Disney, here's your chance! To put it simply, *Movie Maker* allows you to create your own animated video sequence, with up to six actors moving across a painted background, to the sound of music.

To understand how *Movie Maker* works its magic, understand first the basic idea of animation. A real dog running across a room might be broken down into hundreds of individual photographs, each showing the dog's legs and body in a different position. To animate such a running-dog sequence, you would take these photographs and project them in rapid succession, so that the viewer would see continuous motion.

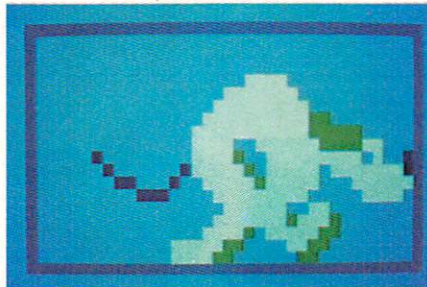
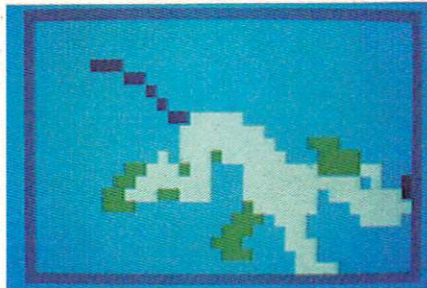
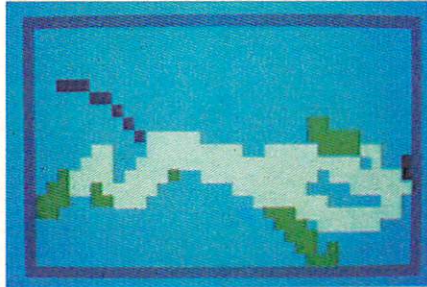
Lucky for us, a running dog can be created from as few as four or five such drawings, which can be cycled over and over again to give the illusion of movement. Add a background and you have a dog running across a room. This is just part of what *Movie Maker* allows you to do.

MANY MENUS

Movie Maker is a powerful creative tool with many options, all selected from a series of menus. The main menu gives a choice of Compose, Record, Smooth, or Play. In Compose, you are presented with another menu that gives a choice of getting a file from your storage disk, or "composing" a new one. By selecting this option, you are transported to a creative drawing board.

You see only one "layer" of the drawing board at a time. The top layer is for creating the shapes you are going to animate (you use a joystick or cursor to draw), and the bottom one is for creating the background over which shapes or actors will move. A simple keystroke moves you from one layer to the other, much like pulling a window shade up and down.

Movie Maker costs \$65 and runs on a 48K Atari. Future versions will run on a 64K Apple, an IBM PC, and a Commodore 64.



*Shots of an animated "running dog" sequence, compiled from *Movie Maker's* "shape page." Besides using ready-made shapes, the user can draw actors from scratch.*

QUICKER THAN FILM EDITING

One remarkable feature of the program is that it allows you to see and refine your animation immediately—a process that takes film animators days. When you're satisfied with the moving shapes, you can duplicate them with a novel "rubber stamp" feature. Move an elastic window across the shape you like, press "D" draw, you can choose any of 64 shapes and animate them to your liking. You make the dog run by pushing "A," for Action. Making a moving dog jump up and down is a simple matter of moving the joystick up and down.

If you don't trust your own hand to for Duplicate, and move the window—you can draw one tree and

stamp out a forest!

A strip at the top of the screen shows the color choices (four of 128 colors can be used at once), and a help menu at the bottom shows various operational features (action, sequence, speed, etc.).

Another remarkable part of *Movie Maker* is the Record section. You can record the animated sequence of each character individually (up to six actors are allowed at once). If you don't like how one moves in relation to the others, you can change it without affecting the others. You can then add sound effects from a built-in selection of 32 sounds and add printed text to the background. Even color changes and zooming can be recorded. Then, the Smooth section automatically smooths out any bumps or flickers in your homemade movie. Go to Play and watch it reel!

PRACTICE REQUIRED

Movie Maker, because of its immense flexibility, will take some time to learn. Drawing attractive images requires persistence. I found that the cursor keys gave greater control than the joystick. It would be useful to be able to use an electronic drawing pad, which is reportedly in the works for future editions. Of course, this would add about \$100 to the cost of the package.

To show its potential and to make learning easier, the program comes with some delightful demonstration examples (on the flip side of the disk) and an instruction manual. The manual I received has some errors and is unclear in places, but it provides the user with a good working knowledge of the program.

Movie Maker is one of those breakthrough programs that comes along once in a great while. It is a program that expands our concept of the home computer as a creative tool—a tool for visualizing and animating short stories you make up. It is, simply, one of the most mind-boggling microcomputer programs I have ever seen and should be a creative challenge for the entire family.

—STAN GOLDBERG



B-17

Reunion

THE "LITTLE COMPUTER THAT COULD" AND A DATA-BASE PROGRAM BRING WWII VETS TOGETHER WITH NEW TIES.

BY JAMES ROBERTS

The Boeing B-17 heavy bomber, designed in 1934 and accepted by the Army Air Corps in 1940, was the world's most formidable long-range bomber of the World War II era. Incredibly tough and much beloved by both air and ground crews, it was dubbed the Flying Fortress in the belief that with its rugged construction and heavy armament it could defend itself in a variety of bombing missions.

Although 12,000 B-17s were built and flown during World War II in all theaters of action, only a few remain today. The Confederate Air Force (C.A.F.), a worldwide nonprofit organization of which I am a member, owns two of these aircraft. In keeping with its goal of maintaining World War II aircraft in flying form, the C.A.F. is restoring these planes to original combat condition, and last summer sponsored a 26-week national tour of one of the B-17 Texas Raiders' airplanes.

When the large metropolitan area in which I live (Cincinnati, Ohio) was chosen as a tour stop, our local C.A.F. flight group served as hosts. It was our feeling that a reunion of local former B-17 combat aircrewmembers, together with the aircraft they had flown, would be an event with lasting memories.

I was assigned the duty of locating at least 10 former crewmembers to serve as honorary crew of the Texas Raiders' airplane during the seven-day public display.

The enormous task of locating 10 select people from a metropolitan area with a population of over one million was at first overwhelming to me. But a call to a columnist on one of the local newspapers resulted in a short mention in his column that a search was on for former B-17 combat aircrewmembers.

It would be an understatement to say that I was not prepared for the response! Phone calls and letters completely swamped me for the next few days, as I attempted to record names, addresses, etc., of each respondent.

The hastily recorded information, written on any scrap of paper available, suddenly be-

A gathering of former B-17 Texas Raiders' crewmembers at Cincinnati's Lunken Airport last summer.

**I ASKED THE
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MISSIONS.**

came disorganized. Recording it was very time-consuming, because I was constantly adding to and changing my master list to keep it in alphabetical order. So I turned to my computer.

I actually have two Timex Sinclair 1000 computers—one at home and one at work. I used the Timex *Organizer* data-base program to keep records of all customer information for my locksmith business, and thought I could do something similar with the B-17 information.

After a few minutes with the TS 1000 and the *Organizer*, I produced a data-base format that included not only NAME and ADDRESS, but also such pertinent data as RANK, CREW POSITION, GROUP, SQUADRON, etc., as well as if a crew member had been shot down in combat and/or had been a prisoner of war.

The Timex *Organizer* is a great program for data storage and retrieval, and in a short time the scraps of paper and sketchy information started to take shape in a completely "organized" manner. As the complete file started to grow I began to notice similarities in some of the entries and decided to search certain categories for related data.

PLAYING WITH THE DATA BASE

The *Organizer* enables the user to display information from any category in alphabetical or numerical order, so I started my search with a listing of all former prisoners of war. A printout from my Timex 2040 printer gave me an interesting list, so I then asked for those POWs who had been shot down in certain areas (Berlin, Gelsenkirchen, etc.). Again—interesting data that matched some of the names on the POW list. How far could I go with this? Next I asked for groups and squadrons by number, and it became apparent that a lot of these guys had been on the same bombing missions.

During this period, word of my search—and of the anticipated arrival of the B-17s at Cincinnati's Lunken Airport—began to spread. The response from former crewmen increased daily, but data was quickly entered and arranged when it arrived. This was an easy process for me, but it wasn't always that way.

TIMEX INDIOSYNCRASIES

Many Timex users complain of difficulty in storing and retrieving data to and from a tape recorder. This is probably one of the weaker points of the TS 1000, and one that gave me a lot of trouble in my early days with the computer. I had many frustrating hours of "no-loads" or "no-saves," and often thought of seeing if the computer would sail like a Frisbee. Patience and downright stubbornness finally enabled me to overcome the difficulties. I have learned from experience the proper volume level (on the tape recorder) to use for each program save or load, and now rarely experience a glitch.

While building my file, I loaded information on crewmen each morning in one of my 1000s. As a precautionary measure (the TS

1000 is known to "white out" at any time), I immediately saved to tape and then reloaded for my next entry. In total, I probably had 40 or 50 saves and loads while building my crewmen file.

At that point my evenings were spent comparing data I had entered during the day. I kept breaking out information under different categories. Asking for Zip Codes in numerical order showed that several crewmen lived in the same Zip area. Further search located two crewmen on the same street, 10 homes apart—and neither was aware of the other. They had a great reunion on their street when I notified them of their proximity. Two other men, friends for 15 years and co-workers in the same industry, were not aware that each had been B-17 crewmen and POWs.

In total, we located 78 former B-17 combat aircrewmen and were able, with the use of the TS 1000 and the *Organizer*, to match up about 60 percent of these people as being in the same bombing group, bombing squadron, POW camp, or as having been shot down on the same mission.


FROM PILOT TO TAIL GUNNER

My original goal of locating 10 former B-17 crewmen to serve as honorary crew, regardless of their position on the aircraft, now became more difficult, as I had to select a crew from the long list of names available. But, going back to my Timex I was now able to select a full crew, from pilot to tail gunner, in the actual positions they had flown, and in the order in which they had responded to my request. This first-come, first-served method was acceptable to everyone concerned, and the printout from my 2040 quickly produced the honorary crew.

Cincinnati's City Council members issued a proclamation naming July 9, 1983, as B-17 Day. The Mayor was present at formal ceremonies on the airfield to read the proclamation and honor these gallant flying men of World War II. Following the official ceremonies, the group was invited to lunch and an open house at the local airmen's club, where they spent an afternoon swapping stories and showing old photos and memorabilia from wartime days.

The plaudits were loud and long for our efforts in bringing this group together. Many of these men had attended previous reunions, but never with "their" aircraft present, nor with such detailed information to bring their pasts to life.

I am not a full-time locator of former anything, and I am sure that names and addresses could have been written with pencil and paper, but matching related data categories without a computer would have been too time-consuming for me to undertake in the short time frame we had for planning.

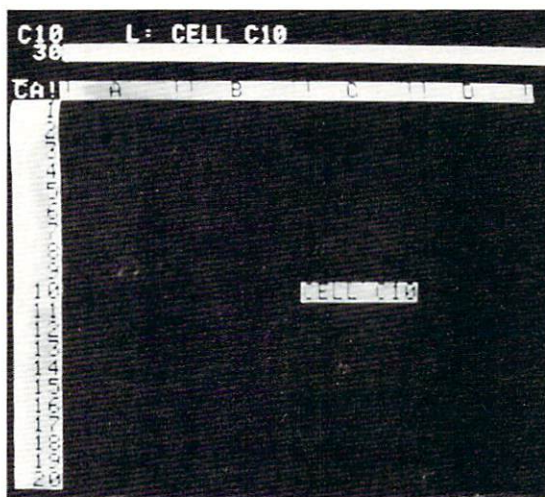
It was a most memorable and successful event. And the hard work and research required was fun and easy with my TS 1000, *Organizer*, and 2040 printer. 

JAMES ROBERTS, a locksmith who lives in Fairfax, Ohio, is a colonel in the Confederate Air Force. He was a pilot over the Pacific in World War II. He contributes to a local Timex users' newsletter, and writes software reviews for FAMILY COMPUTING.

HomeCalc

SPREADSHEET SOFTWARE—WHAT'S GOOD FOR GENERAL MOTORS CAN BE GOOD FOR YOU, TOO

BY CHARLES H. GAJEWAY



An electronic spreadsheet in its pristine state, waiting for labels and numbers to be entered. The cursor (white square) is in column C, row 10, or C10.

In 1979 (ancient history in the world of personal computers), a student at the Harvard Business School, tired of the endless manipulation of numbers required for his courses, conceived the idea of using a computer to automate the functions of an accountant's spreadsheet. He roped a friend into programming his idea for an Apple II. In 1980, that idea hit the market as *VisiCalc*. Business people started snapping up *VisiCalc* and personal computers on which to run it. *VisiCalc* became the program most responsible for the personal computer explosion. Almost every microcomputer sold for professional use includes *VisiCalc* or one of its competitors as an integral part of the system.

Home users are now becoming heavy computer buyers and users, too, but their favorite programs are games and word processors. The flexible, powerful number handling that spreadsheet software offers is not seen as a prime need in the home. But a home and a family are just as much a business as General Motors, and having a powerful, easy-to-use number processor at your disposal can be a big help. The intent of this article is to explain what these programs are, and how they work, and to give some examples of how they can be useful in a nonbusiness context.

WHAT'S A SPREADSHEET?

Spreadsheet or analysis paper has long been used in business to help organize and present accounting and analytical data. Typi-

cally, a spreadsheet is a large sheet of paper ruled into boxes arranged in rows and columns, with space for descriptive labels along the top and left edge. In use, one labels the rows and columns according to the task at hand, fills in known data, then uses a calculator to compute the remaining values, writing down the results one at a time. Even relatively modest reports can take hours of patient, meticulous work to complete; complex analytical reports or long-range projections can take weeks, even months, when the inevitable revisions are included.

THE COMPUTER VERSION

An electronic spreadsheet, however, is considerably more powerful. The computer's video display and memory are divided into rows and columns of boxes, much as a paper spreadsheet. This matrix of boxes (or "cells") is formatted into a worksheet by typing in labels, and known data is entered appropriately, as with a paper spreadsheet. Here is where the similarity ends.

Instead of using a calculator to compute mathematical results based on the known numbers, the user types a "formula" into the box where a computed result should go; this formula specifies a mathematical relationship that can apply to any number of boxes in the worksheet. (Most worksheets have 254 rows and 254 columns.) The computer then will perform that calculation and display the results on the screen, keeping both the formula and its

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**THE AVERAGE
PERSON NEEDS
ABOUT 10
HOURS TO
LEARN HOW TO
USE A
SPREADSHEET
PROGRAM.**

answer in Random Access Memory (RAM).

The user can duplicate similar formulas over a large area of the video "page," eliminating a considerable amount of typing. For example, one could put in a formula to arrive at a monthly total, then duplicate that formula into 12 columns to add up to those items for the remaining 11 months and the full year.

The real power of the worksheet, though, is that the results of a change to the worksheet are calculated quickly and automatically, as the change is made. An error or revision that could take hours or even days to recompute manually can usually be done in minutes using a calc program. This kind of power and speed is just as useful at home as it is in the corporate office.

HOW THEY WORK

A typical spreadsheet program presents the user with a video screen divided into rows and columns. The rows are numbered, and the columns lettered. The box, or cell, created where a row and a column meet is referred to by its location; i.e., the cell formed where column C meets row 10 is C10 (see photo). If the program has just been started, there will be an inverse (white) rectangle in cell A1; this is the active cell where data can be entered, and is called the cursor. Above the worksheet area is a blank area where information on system status and work in progress will appear as the user progresses. The user has complete control of the cursor, and can fill cells with labels and values as desired (values can be either numbers or formulas).

The basic functions used to operate a spreadsheet program are: entering data, using built-in formulas for special calculations, and issuing system commands to achieve desired appearance and operation. If it sounds simple, it is. The average person needs about 10 hours to learn and become familiar with the program's operation, considerably less time than it would take to gain comparable BASIC programming skills. Considering the power and flexibility of a good calc program, 10 or even 20 hours is not a large investment; my own initiation time paid itself back the very first time I used the program seriously!

THREE-PART LEARNING

1. Labeling. The easiest part of learning is entering labels, data, and formulas; they are just typed into a box. The user moves the cursor from box to box with "arrow keys." This process is very much like using an electronic pencil. Once some feel for the keyboard is gained, it's just as fast as writing, and sometimes faster.

2. System Commands. Next comes learning about a variety of system commands that affect the way the worksheet looks or operates. Usually, commands are begun by pressing the slash ("/") key, followed by the first letter of the command name ("R" for replicate, "B" for blank,

etc.). Most commands have several options, also selected by one key press. Learning what the commands do and getting familiar with their operation is the major part of the initial learning effort.

3. Functions. The rest involves learning the functions available. A function is essentially a preprogrammed formula denoted by the "at" sign (@), and entered as a formula or part of one. These functions extend the power of a spreadsheet considerably, since they can be linked and intertwined. They may seem difficult or obscure at first, but they become very handy as users refresh their math skills and progress to more and more sophisticated worksheets.

The best way to learn how an electronic spreadsheet works is to use one. To demonstrate both the relative ease of using a "calc" program and some nonbusiness uses for them, I have constructed two short but practical examples. Try them out at a friend's house, a user-group meeting, or in a computer store. All the commands and functions used to build them are explained parenthetically. The commands used are true VisiCalc commands; the printout illustrations were prepared with 1-2-3, a combination spreadsheet, data-base, and graphics program, because of some of its very special capabilities.

A LITTLE FINANCE

The first example will be to build a spreadsheet checkbook register. The worksheet will automatically compute a running account balance, help reconcile bank statements, and keep neat, centralized records of checks and deposits. It could easily be expanded into a complete financial tracking system, but let's stick with the basics for now.

1. Most calc programs have a standard column display that is nine-characters wide. This is a little cramped for our purposes, so let's widen that to 12 by typing /GC12 (Global Column Width, 12 characters). In addition, most numbers will be shown in monetary format, so we type /GFS (Global Format dollars and cents). This will produce numbers that are uniformly displayed with two decimal places. Whenever you type in commands or functions, press the RETURN or ENTER key.

2. Next, label the columns, starting in cell A1, as follows (see Figure 1 for an example):

Column A	CHECK #
Column B	DATE
Column C	PAYEE
Column D	blank
Column E	DEPOSITS
Column F	CLEARED?
Column G	PAYMENTS
Column H	BALANCE
Column I	OUTSTANDING

3. Beginning again in A1, we will enter a formula that will create semi-automatic check numbering. Type 1+A1. This formula simply

	A	B	C	D	E	F	G	H	I
1	*	CHECK #	DATE	PAYEE	DEPOSITS	CLEARED?	PAYMENTS	BALANCE	OUTSTANDING
2	*	1+A1						+H1+E2-G2	@IF(F2=0,I1+E2-G2,+I1)
3	*								
4	*								
5	*								
6	*								
7	*								
8	*								
9	*								
10	*								
11	*								
12	*								
13	*								
14	*								
15	*								
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98	*								
99	*								
100	*								

Figure 1. Worksheet with headings and user-entered formulas.

	A	B	C	D	E	F	G	H	I
1	*	CHECK #	DATE	PAYEE	DEPOSITS	CLEARED?	PAYMENTS	BALANCE	OUTSTANDING
2	*	OB	SEP.1	OP.BAL.				425.00	0.00
3	*		219 SEP.9	E.JONES, MD			1 45.00	380.00	0.00
4	*	DEP	SEP.10	GIFT FROM MOM	75.00			455.00	75.00
5	*		1					455.00	75.00
6	*		2					455.00	75.00
7	*		.					455.00	75.00
8	*		.					455.00	75.00
9	*		.					455.00	75.00
10	*		.					455.00	75.00
11	*		.					455.00	75.00
12	*		.					455.00	75.00
13	*		.					455.00	75.00
14	*		.					455.00	75.00
15	*		.					455.00	75.00
16	*		.					455.00	75.00
17	*		.					455.00	75.00
18	*		.					455.00	75.00
19	*		.					455.00	75.00
20	*		.					455.00	75.00
21	*		.					455.00	75.00
22	*		.					455.00	75.00
23	*		.					455.00	75.00
24	*		.					455.00	75.00
25	*		.					455.00	75.00
26	*		.					455.00	75.00
27	*		.					455.00	75.00
28	*		.					455.00	75.00
29	*		.					455.00	75.00
30	*		.					455.00	75.00
31	*		.					455.00	75.00
32	*		.					455.00	75.00
33	*		.					455.00	75.00
34	*		.					455.00	75.00
35	*		.					455.00	75.00
36	*		.					455.00	75.00
37	*		.					455.00	75.00
38	*		.					455.00	75.00
39	*		.					455.00	75.00
40	*		.					455.00	75.00
41	*		.					455.00	75.00
42	*		.					455.00	75.00
43	*		.					455.00	75.00
44	*		.					455.00	75.00
45	*		.					455.00	75.00
46	*		.					455.00	75.00
47	*		.					455.00	75.00
48	*		.					455.00	75.00
49	*		.					455.00	75.00
50	*		.					455.00	75.00
51	*		.					455.00	75.00
52	*		.					455.00	75.00
53	*		.					455.00	75.00
54	*		.					455.00	75.00
55	*		.					455.00	75.00
56	*		.					455.00	75.00
57	*		.					455.00	75.00
58	*		.					455.00	75.00
59	*		.					455.00	75.00
60	*		.					455.00	75.00
61	*		.					455.00	75.00
62	*		.					455.00	75.00
63	*		.					455.00	75.00
64	*		.					455.00	75.00
65	*		.					455.00	75.00
66	*		.					455.00	75.00
67	*		.					455.00	75.00
68	*		.					455.00	75.00
69	*		.					455.00	75.00
70	*		.					455.00	75.00
71	*		.					455.00	75.00
72	*		.					455.00	75.00
73	*		.					455.00	75.00
74	*		.					455.00	75.00
75	*		.					455.00	75.00
76	*		.					455.00	75.00
77	*		.					455.00	75.00
78	*		.					455.00	75.00
79	*		.					455.00	75.00
80	*		.					455.00	75.00
81	*		.					455.00	75.00
82	*		.					455.00	75.00
83	*		.					455.00	75.00
84	*		.					455.00	75.00
85	*		.					455.00	75.00
86	*		.					455.00	75.00
87	*		.					455.00	75.00
88	*		.					455.00	75.00
89	*		.					455.00	75.00
90	*		.					455.00	75.00
91	*		.					455.00	75.00
92	*		.					455.00	75.00
93	*		.					455.00	75.00
94	*		.					455.00	75.00
95	*		.					455.00	75.00
96	*		.					455.00	75.00
97	*		.					455.00	75.00
98	*		.					455.00	75.00
99	*		.					455.00	75.00
100	*		.					455.00	75.00

Figure 2. Completed worksheet with sample data.

adds one to the previous number that appears in the column. All we have to do is type in the first check number, and the rest will be in automatic sequence. This will become clearer as we enter test data later. Since check numbers don't need to be in monetary format, type /F1 (Format Integer) to show the check numbers as whole numbers.

4. Columns B through G are for data entry, and don't require formulas. However, we should go to F2 and type /F1 again, as this column does not require monetary display either. Moving on to column H, we will compute the account balance by taking the previous balance and adding a deposit or subtracting a check. So enter the formula +H1+E2-G2; this will handle either type of transaction correctly. (The + sign indicates that you are entering a formula; without it, the computer thinks you are entering a text label in that cell.)

5. When we compute the total outstand-

ing items in column I, we need to do a fancy maneuver known as a *conditional computation*. Just as in a manual register, if the clearing indicator column is blank (or zero), then the item is outstanding and should be included in the outstanding balance. If that column is not blank (nonzero), then it has cleared, and should not go into the outstanding balance. So the conditional computation for our worksheet is that if column F=0, then take the outstanding balance from the previous line in column I, and add a deposit or subtract a check (I1+E2-G2, as in the previous column). Otherwise, carry the previous balance forward (a simple +I1 does the trick). We will use a function to do this: move the cursor to I2 and type @IF (F2=0,I1+E2-G2,+I1). The first item in the parentheses is the comparison, the second is the computation if the comparison is true, and the third is the computation if the comparison is false.

The spreadsheet with checkbook-register labels included (above); the same register with several entries made (below). The \$45 check has cleared and been cashed, noted by the 1 in column F. The \$75 deposit has not yet cleared. Both these transactions are noted in the BALANCE and OUTSTANDING columns.

**TAP A FEW KEYS
AND THE
SKELETON
WORKSHEET
WILL EXPAND
MAGICALLY INTO
A FULL-SIZE
REGISTER.**

6. The final formula will set up the reconciliation aid. We need to leave room for a reasonable number of checks, so move the cursor to cell H78 and label it BANK BALANCE. Type >H78 and RETURN to make the cursor jump to H78. Move one row down and type the label RECONCILE. Now move one column right, to I79, and enter the formula +I78+I76. This formula takes the bank statement balance entered into I78 and adds the final outstanding balance, thus adding all outstanding deposits and subtracting outstanding checks from the bank's figure. The result should equal the account balance shown in H76. Figure 1 shows the worksheet at this point in its development.

7. Now that we have entered all the basic formulas we will need, let's use the copy command to expand our skeleton worksheet to full size, with enough room for 75 checks. The command is /RA2...I2:A3...A76. (Replicate the formulas and formats between A2 and I2 into the rows starting with A3 and ending with A76). You will be asked, NO CHANGE? or RELATIVE? Type "R" for RELATIVE. Our skeleton worksheet will expand almost magically into a full-size register, and we are done. Type /SSREGISTER (Storage Save filename REGISTER) to save the worksheet to disk or tape, and we can try out our creation. Make sure you have a blank tape or disk ready.

8. Moving the cursor to A2, we'll begin testing by entering the opening balance. Type OB into the A2 in place of a check number. This label will overwrite or replace the I+A1 formula there. Almost instantly, the checks will be renumbered, beginning with 1 in row 3. Enter OP. BAL. in the payee column to identify the entry, then move to column H and enter 425 as the opening amount.

9. Moving down to A3, enter the first check number, say 219. This value will overwrite the formula, and be picked up in the following cells, creating an automatic succession of check numbers. The only time you will have to enter a check number is following a noncheck transaction such as a deposit or a bank charge. A small, but convenient time-saver.

10. To continue, enter the date, then the payee—E. JONES, MD—then 45 for the check amount. Enter a 1 in F3 to indicate that the check has been cashed and has cleared. Notice that the account balance and outstanding balance columns automatically change to reflect the new entry. This demonstrates the power of automatic recalculation, and the efficiency of the computer in performing repetitive calculation.

11. To complete our test, enter a deposit of \$75.00 in the next row (enter DEP in column A to interrupt the automatic check sequence). Mark the check as not cleared by leaving FY open. Notice that the \$75.00 is listed as OUTSTANDING. Type >I78 (Go to cell I78), and enter 380 for the bank statement balance. Compare H76 with I79; they should both read 455.00,

indicating that our short test is indeed in balance.

With the automated math of the register, there are only two possible reasons to be out of balance. Either you and the bank have recorded a transaction differently (i.e., you show a check as 29.95, and the bank recorded it as 25.95), or the cleared status of an item is not correctly marked. Searching for these kinds of errors is much easier, faster, and less frequent than tracking down an elusive math error in a handwritten register.

BOWLING FOR NUMBERS

For the second example, let's try something a little more ambitious: a worksheet to automatically calculate bowling averages for your team, both by week and for the season to date. A spreadsheet program makes this tedious task as easy as typing in this week's scores.

Assuming that there are four bowlers on your team and four weeks in the season, set up the worksheet as follows:

1. Enter /GC12 to set column width at 12 spaces. Enter /GFI (Global Format Integer number display) to display average scores to the nearest whole pin. Enter @NA in cell B2. Type /RB2:C2...F2 (replicate B2 beginning with C2 through F2), then /RB2...F2:B3...B21. This will fill the data area with the value NA (Not Available). The purpose of this will be explained later.

2. Label the columns of row one with players' names (TOM, DICK, JANE, and ANNE, for example), beginning with column B. Column F will be titled TEAM SCORE.

3. Starting in cell A2, label the rows like this: GAME 1; GAME 2; GAME 3; WEEKLY AVG.; SEASON AVG. Type /RA2...A6:A7 to copy these labels once. Type /RA2...A11:A12 to copy the first two sets of labels, and complete the four-week season.

4. Go to cell B5 and enter @AVERAGE (B2...B4). This function will automatically average the first week's scores. Since the first week's average is the same as the season average at that point, move the cursor down to B6 and enter +B5 to duplicate the average.

5. Type /RB5:B10 to copy it into the second weekly average. Move the cursor to B10 and type /RB10:B15, then go to B15 and type /RB15:B20, and specify RELATIVE. The weekly average formulas are now complete.

6. Enter the season average formulas as follows: in B11, enter (B5+B10)/2; in B16, type (B5+B10+B15)/3, then in B21, enter (B5+B10+B15+B20)/4. These formulas compute the successive weekly averages.

7. One formula is all that's necessary to compute team scores. Bringing the cursor to F2, enter @SUM(B2...E2). This will add up all the player scores and averages to produce the team statistics. Type /RF2...F2:F3...F17 to fill in the team column with the new formula. Figure 3 shows the worksheet at this point, for your reference.

8. The final step in completing the worksheet's formulas is to copy the formulas in column B into C, D, and E. This is done with /R2...B17:C2...E2. This tells the program to copy all the formulas in column B from row 2 to row 17 into rows C through E, also beginning with row 2.

9. While the worksheet is complete, it is somewhat hard to read, because there is no visual separation between the individual game scores and the averages. We can take care of this by using a system command to insert blank rows where extra space is needed. There's no need to worry about changing cell addresses by adding extra rows, as the program automatically makes any necessary alterations. Moving the cursor to row 16, type /R to insert a blank row above the WEEK 4 AVERAGE line. The averages move down a line, and a blank row appears between them and the game scores. Move the cursor upwards, inserting a blank line before and after each set of game scores. This is the final step; type /SSBOWLING SCORES to save the worksheet to disk or tape.

Using the scoresheet simply requires you to enter the game scores. Team scores and averages are computed automatically. Future games and averages appear as NA (Not Available); any formula referring to a cell that contains @NA automatically has an answer of NA. The reason that we used this feature is that the @AVERAGE function would give an answer of ER-

ROR for any week where scores have not yet been entered. Long experience has taught me that no computer program should ever show an answer of ERROR if people are to trust the computations. It's worth the small extra effort to get NA instead of ERROR, no matter who is looking at the worksheet.

NOW WHAT?

These two examples are just the tip of the iceberg. Numbers play a big part in everyone's life, if you stop and think about it. Having a simple but powerful resource like a calc program can be a big timesaver. Books and pre-programmed worksheets (called *templates*) are available to provide ideas and techniques for a wide variety of personal uses for these programs. Your own understanding of what these programs can do and what they can be used for will grow with experience, and so will your usage of the program. [See "Making Up Your Mind with VisiCalc" in the November issue.]

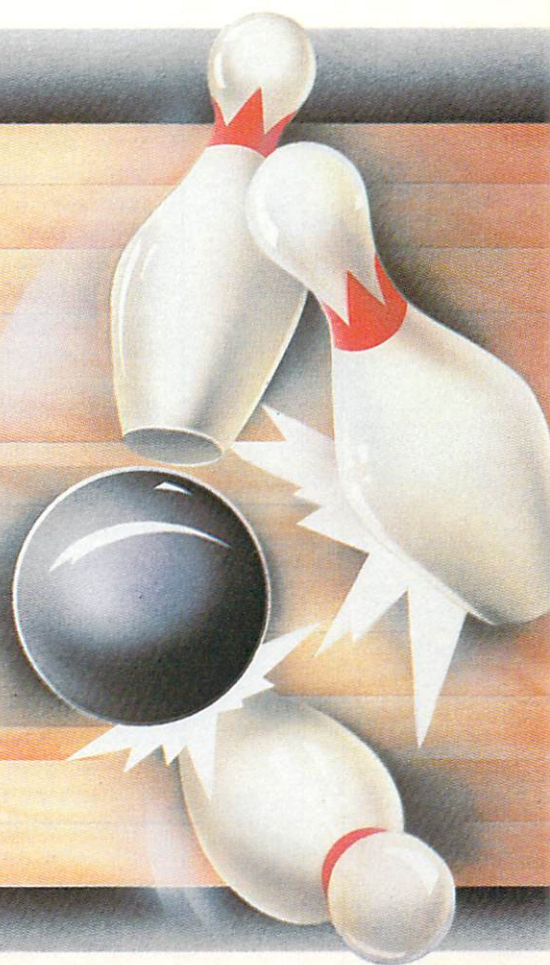
My own feeling, echoed by the experiences of many others, is that no personal computer system, home or business, is complete without a spreadsheet program. Many jobs that are well-suited to being automated, but seem too small to write a special-purpose program for, or too large to program quickly, can be done using a spreadsheet, creating more time in your life for the things you want to do. Try one—

NUMBERS PLAY A BIG PART IN EVERYONE'S LIFE—A POWERFUL RESOURCE LIKE A CALC PROGRAM CAN BE A BIG TIMESAVER.

When each player's game scores are entered, the weekly average and seasonal average are automatically computed by the calc program.

		A	B	C	D	E
1	*	TOM	DICK	ANNE	JANE	TEAM SCORE
2	*	GAME 1	150	160	140	586
3	*	GAME 2	135	174	146	587
4	*	GAME 3	146	158	150	568
5	*	WEEKLY AVG	144	164	145	587
6	*	SEASON AVG	144	164	145	587
7	*	GAME 1	140	180	138	591
8	*	GAME 2	176	194	146	651
9	*	GAME 3	180	176	136	632
10	*	WEEKLY AVG	165	183	140	625
11	*	SEASON AVG	155	174	143	606
12	*	GAME 1	150	194	160	654
13	*	GAME 2	162	188	162	667
14	*	GAME 3	149	182	155	633
15	*	WEEKLY AVG	154	188	159	651
16	*	SEASON AVG	154	178	148	621
18	*	GAME 1	190	180	146	654
19	*	GAME 2	145	188	139	612
20	*	GAME 3	160	194	142	648
21	*	WEEKLY AVG	165	187	142	638
22	*	SEASON AVG	157	181	147	625

Completed worksheet with test data.



SPREADSHEET PROGRAMS: FEATURES TO LOOK FOR

There are a number of spreadsheet programs on the market: *VisiCalc*, *SuperCalc*, *MagiCalc*, *PlannerCalc*, *PeachCalc*, *EasyCalc*, *PerfectCalc*, *MultiPlan*, and *CalcResult* are a few of them. The fact that this software is primarily aimed at business and professional users has two unfortunate side effects. With few exceptions, effective spreadsheet programs are not available for the smaller home machines (TRS-80 Color Computer, Atari 400, Commodore VIC-20, etc.); and they are relatively expensive, priced between \$150 and \$250 (although these prices are often heavily discounted).

Apple and IBM users have the widest choice of software, with owners of the 64K CP/M machines (Osborne, Heath/Zenith, Epson, NEC, etc.) next. A couple of programs are now available for the Commodore 64 (including the hot-selling, full-featured *MultiPlan*), and *VisiCalc* is offered for the Atari 800/1200XL and several models in the TRS-80 line. Even the tiny Timex Sinclair has a miniature spreadsheet.

A recent development has been the appearance of spreadsheet-based software that offers other functions as an integrated part of the program. Programs like Lotus Development Corporation's *1-2-3*, Context Management's *MBA*, Ovation Technologies' new *Ovation*, and *VisiCalc IV* from VisiCorp offer word processing, data-base management, graphics, and other sophisticated abilities, generally to owners of IBM-type machines with a minimum of 192-256K of user memory and two double-sided disk drives. If you have an IBM or similar computer, you may want to consider such a program; it may be the only software you ever require.

SAUCE FOR THE GOOSE OR SAUCE FOR THE GANDER?

While most calc programs operate in a very similar way, they are not identical. If there is more than one program available for your machine, you should consider the features and operations carefully before making a choice. In general, the special features offered by competitive software are additions to or extensions of the basic capabilities of *VisiCalc*. Its popularity has made it the standard of comparison. If *VisiCalc* is available for your computer, the search should begin there, though many end up with *MultiPlan*, which has more features than *VisiCalc*. It is, however, slower. A discussion of several major features and points of comparison follows.

1. Formatting. Some programs offer varying degrees of flexible display formatting, such as variable column widths, variable decimal display, and use of commas and/or dollar signs in large numbers. This is important if you need well-arranged, professional-looking printed reports.


2. Functions. Every spreadsheet has its own combination of financial, scientific, and mathematical functions. Logic functions (which allow you to say, IF the check has cleared, THEN it should not be included in the outstanding balance) can add much flexibility to spreadsheeting. You probably wouldn't buy a program just for its functions, but it could help make your final choice easier.

3. Sorting. Several newer programs have the ability to sort, or rearrange, worksheet data by numerical or alphabetic value. This can be very helpful in analyzing large amounts of data, or in producing special reports (e.g., sorting a customer information sheet by name, or by Zip Code, or by total sales).

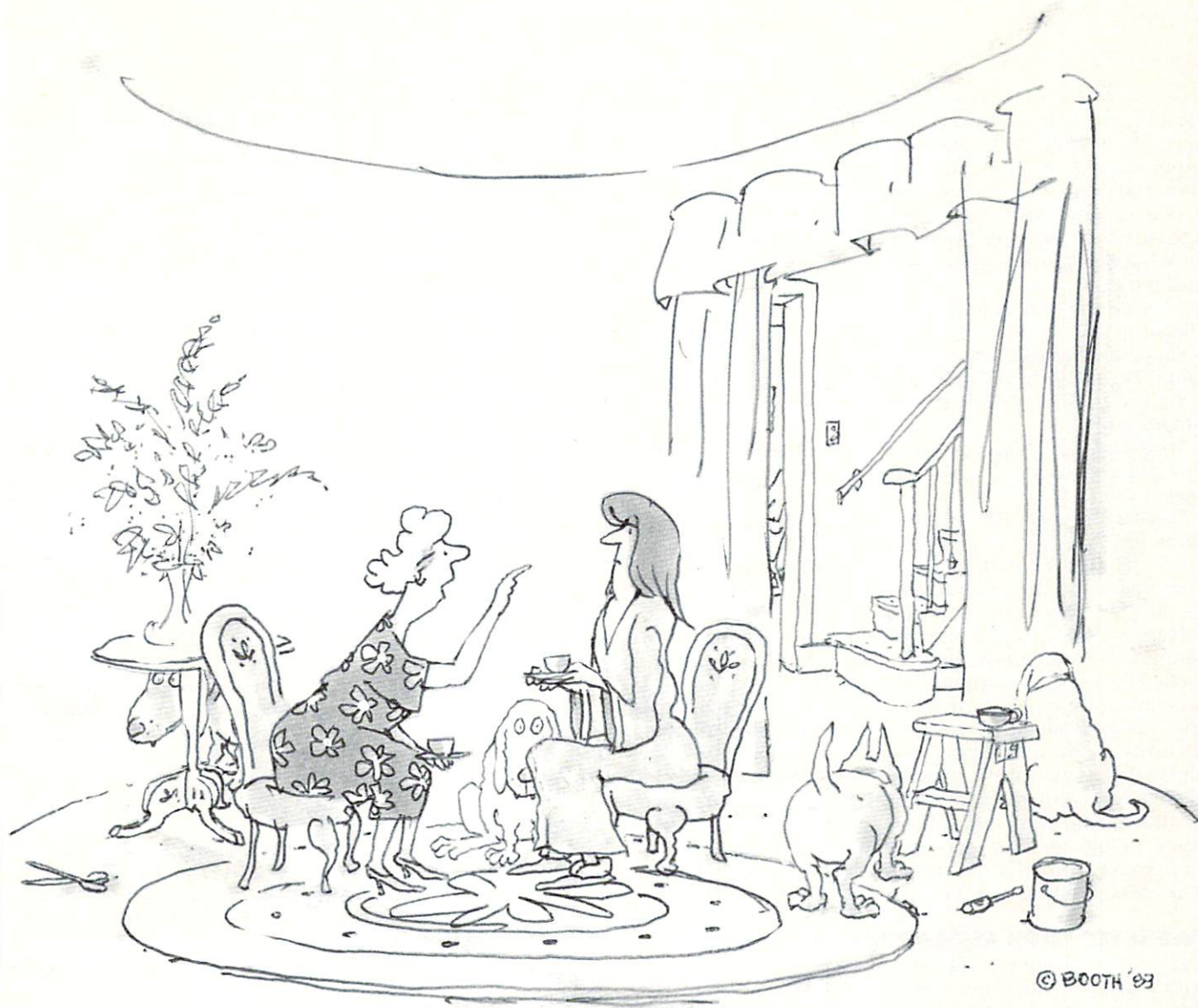
4. Linking. Some programs offer one or more ways to link or combine other worksheets. This can be an effective way to expand limited memory, or to combine a series of related worksheets, or, in using a master data file, to support several worksheets.

5. Compatibility with other software. A recent trend is toward software "families," in which different programs from the same publisher will use common data-file and system commands. If you have other software from such a family, it can be advantageous to use a compatible spreadsheet.

Other concerns should be for the speed and efficiency of the program, the amount of memory available to the user, and its ease of use. To test this, type in data, and see how fast the computer responds. Programs vary markedly, especially in speed. Taken together, these factors have much to do with the "user-friendliness" of a program. Some software, particularly those with many features, can be slower, harder to use, and use more memory than less complex programs.

The benefits and drawbacks of these special features must be weighed carefully against your own needs and way of working. Each of the calc programs has a loyal, pleased group of users, and each has those who sneer at its features and operation. It is up to you to decide whether sauce for the goose or sauce for the gander is most appropriate for your plateful of tasks. 

**EACH CALC
PROGRAM HAS
A LOYAL GROUP
OF USERS; AND
EACH HAS THOSE
WHO SNEER AT
IT.**



"The very minute that thing comes into your house, Wanda,
establish your computer rights!"

BUYERS' GUIDE TO MASS-STORAGE DEVICES

CASSETTE RECORDERS; FLOPPY DISK DRIVES; WAFFER TAPE; HARD DISK DRIVES

Back in the wild and woolly early seventies, a pioneer (of sorts) built himself a computer. He worked on that computer day and night, hacking away—making little changes here and there. Programming and pruning and perfecting.

One day he called in a friend to witness a brand-new enhancement he'd designed for his marvelous machine.

"What is it?" the visitor asked, ogling the trailing wires and plugs.

"A cassette-tape controller!" he answered excitedly. "Watch!"

And sure enough, he touched some buttons and the old piano-key cassette recorder on his workbench started to turn. It took only two or three minutes to save that first 3K program file.

"Hot Diggity!" said the astounded observer, slapping him on the back. "That's really gonna make life a lot easier, isn't it?"

"Easier? Easier? My gosh, now I can turn the darn thing off!"

And he did. Without losing his program.

Before, when the computer's power was cut off, its internal memory was drained—and the program with it.

Mass-storage devices and media that save data turn computers from programmable playthings into powerful tools. Few areas of computer technology are expanding as quickly as those providing faster, more reliable, more compact, more capacious ways of storing and retrieving data. As a result, the microcomputer user, limited a few years ago to the single option of cassette, now has some freedom of choice in configuring the mass-storage side of a system. In this article, we'll talk about the most important currents in information-storage technology, examine some equipment, and discuss the pros and cons, hows and whys of upgrading your current mass-storage resources.

CASSETTE TAPE RECORDERS

Almost every microcomputer on the market can connect with a cassette one way or another. The vital component of this connection is a circuit called a **cassette interface** that converts the digital signal from the computer into audio-type signals that the recorder can store; and vice versa. Many computers have these interface circuits built-in, and can work with any standard cassette deck (and appropriate cable). Others, such as the Atari and Commodore computers, do not have a built-in interface, and, instead, send raw digital data out to a recorder. In these cases, the interface is built into a special tape recorder supplied by the computer manufacturer.

Though some interface systems may allow the computer to stop and start the tape recorder motor as part of an operation, communication between computer and recorder is otherwise passive. Data may be **read** (transferred from computer to tape) or **written** (transferred from tape to computer), but the computer cannot sense the tape

recorder's operating state or the position of the tape, nor can it control the recorder's major functions (forward, rewind, etc.) As a result, cassette files can't normally be indexed by location, and immediate location of files and records is not possible under computer control.

Access of individual files is done by reading the tape sequentially, one file after another. Reading sequentially means that if you wish to retrieve a "Smith" file from an alphabetical list, the computer reads past Abernathy, Barnes, Cole, etc. More commonly, the user positions the tape to where he knows a file has been recorded, prior to commanding the computer to perform the access operation. For this reason, cassette mass storage is wholly inappropriate for certain types of application, particularly data-base work requiring constant modification of files.

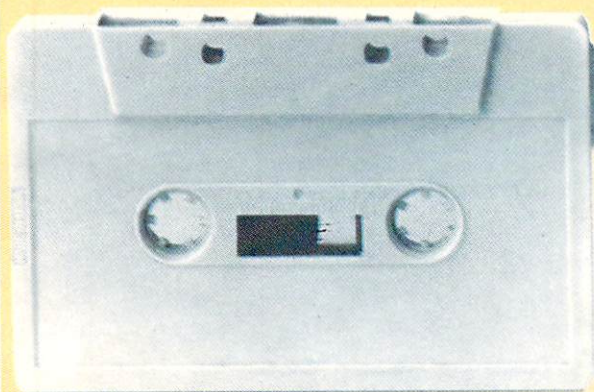
Other limitations of cassette mass storage result from the fact that cassette recorders are really not designed for use with computers. Cassette decks are engineered to handle a smoothly varying audio signal and have some trouble reproducing the quickly changing high/low pulses of computer data with proper separation. To prevent blurring of the signal, the maximum rate at which data can be stored to or read from a cassette must be limited to about 150 characters per second—about 30 times slower than is possible with a floppy disk. Further exacerbating the electronic reliability problem is the fact that some standard cassettes, manufactured for audio reproduction, can suffer from dropouts and other physical imperfections that play havoc with data retrieval.

Buying Tips

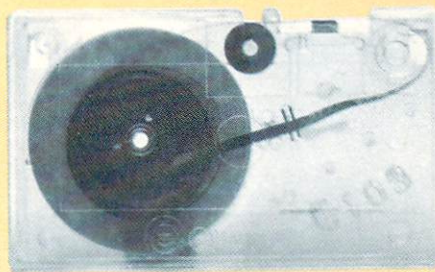
On the plus side, cassette mass storage is inexpensive to set up, and quite capacious. Even the special data recorders required by certain computers can be obtained for well under \$100, standard recorders for considerably less. This compares with an initial investment of between \$300 and \$500 for a disk drive. A C-90 cassette, ranging in price from \$3 to \$5, can store up to 500,000 characters (about 250 typed pages) of raw data—and is thus about on a par both in capacity and price with a double-sided, double-density disk. Of course, it would take about four minutes to retrieve data at one end of the tape.

If your computer cannot interface to a standard tape deck, you must use the (usually overpriced) data-cassette recorder produced by the computer manufacturer. If, on the other hand, you can use a standard deck as a peripheral, here are a few buying guidelines to follow.

- The best piece of equipment for your purposes will be a bargain-basement cassette recorder of the piano-key type that works off house current instead of batteries. Line power is cheaper than batteries, and tends to drive a tape recorder at a more constant speed, important for the proper spacing of digital signals. The piano-key design is stable and easy to operate one-handed.



Both standard audio and special computer cassettes can be used as storage media on most microcomputers.



A wafer tape (also known as a Stringy Floppy, a trademark of Exatron) is basically a high-speed cassette tape designed to be used with a computer.

- Low-quality recorders are generally better for digital applications because they respond only to the peaks of a digital signal (the high and low tones) and fail to track the slopes between. (In audio recording, of course, this is a disadvantage known as "poor frequency response".)

LIVING WITH CASSETTES

If your priorities or your budget dictate that you won't be upgrading your cassette-based home computer system anytime soon, there are still ways to make the most of the equipment you have. Here are a few tips on improving the performance of cassette mass storage for computers:

1. The One-Minute-of-Silence Rule: Because of manufacturing stresses and continued rewinding, the first minute or so of a typical cassette is more prone to developing dropouts than the center portion of the tape. If possible, avoid starting data files at either the very beginning or the very end of a cassette.

2. The Short-and-Sweet Rule: If you can get them (try computer stores), shorter cassettes are almost always more reliable for data storage than longer ones. C-10 cassettes (five minutes per side) are ideal, particularly leaderless ones.

3. The Brush-Once-in-the-Morning Rule: Cleanliness is an ally in maintaining any kind of magnetic media in top condition. Keep your cassettes free of dust—never touch the tape itself with fingers. Also, periodically clean the heads of your recorder with a little rubbing alcohol on a cotton swab. This treatment removes the inevitable buildup of oxides that accumulate on the heads with constant use. Aligning the recording heads (see your cassette recorder owner's manual for details) can also cure some subtle LOAD/SAVE problems.

4. The Copycat Rule: Always make backups! If your computer has a save-verify feature—a function that compares data stored on tape with data resident in memory to ensure a match, indicating the SAVE is good—learn how it works and use it religiously on every file you create. Always make at least one backup of everything—preferably keeping originals and backups on separate cassettes to allow for the risk that one is somehow flawed.

5. The Volume-Setting Trick: If you're having trouble saving data, the problem may be that the volume control is set too high or low. There is no hard-and-fast rule, as different computers and different cassettes work better at different settings. Just experiment; and when you find a setting that works, stick to it.

- Further advice: Under no circumstances should you attempt to connect stereo-grade component cassette drives to a home computer. Signals produced by this equipment are powerful enough to burn out the computer's interface.

If you do not intend to use your computer for applications that require complex and very rapid access to large files, cassettes can be an efficient and inexpensive mass-storage resource. Their weaknesses in reliability and speed can be ameliorated by observing a few basic precautions and rituals in cassette handling and maintenance. If, on the other hand, you are interested in large-scale word processing, data-base management, or other file-intensive applications, or if you need more speed overall in data handling, you should consider upgrading to a disk system.

DISK DRIVES

Floppy disks and drives are probably the best compromise—in speed of data access, reliability, convenience, and cost—of all microcomputer mass-storage options.

Floppy disks are made of Mylar plastic, coated with a film of metal oxide and wrapped in a protective vinyl sheath. The oxide surface of the medium can accept magnetic impressions the same way as recording tape. A disk is **formatted** (or initialized) prior to use into a pattern of concentric tracks, divided into sectors. This pattern acts as a magnetic road map for organizing data. Files written to disk are indexed elsewhere on the disk by track and sector; by reference to this index (called a **directory**), the computer can locate and access disk files in any order. This facility, called **random access**, coupled with the great data-transfer speed and storage capacity of floppy disks, can put a fairly large quantity of data on-line for almost instantaneous use.

Three main components make up the internal mechanism of a disk drive: the spindle and its motor, the read/write head(s), and the head-positioning equipment. During reading and writing intervals, a floppy disk spins at up to 300 rpm. The read/write head of the drive gains access to the spinning surface of the disk through a narrow aperture in the face of the disk jacket, and moves back and forth over its surface. The head is actually in contact with the surface of the disk most of the time.

What You Need

Unlike cassette systems, which require constant monitoring and manual adjustment, disk drives work primarily under computer control. This kind of cooperation requires complex communication between a disk drive and its host computer, and depends on both hardware and software: specifically a circuit called a **drive controller** and a program called a **DOS**, or Disk Operating System. In other words, you need more than just a disk drive [see chart].



A 5 1/4-inch floppy disk, currently the standard size for microcomputers.



A 3 1/2-inch disk, which some high-end computers use, is incompatible with most microcomputers. But it may become the standard of the future.

Controller circuitry is the brains of the drive. Depending on the brand of computer you own, the controller may be contained either inside the drive itself (in which case the drive is referred to as **intelligent**); installed in the body of the host computer either in the form of a circuit board or plug-in module; or elsewhere as in a **peripheral expansion housing**. Likewise, the DOS, a program that manages input and output to and from disk (as well as other functions) may be in one of several places depending on system design: Though it may be located in the disk drive, it's more commonly located in the memory of the host computer, via a ROM chip upgrade, plug-in module, or a disk program loaded into RAM.

Because the DOS is a program, it will require a certain amount of memory from the host computer just to manage the disk drive. Using the higher functions of the DOS (for copying one disk onto another, for example) will sometimes require the greater portion of available RAM. Thus, there is always a minimum RAM size prerequisite for disk use. The Atari 400 computer, for example, is a fully functional cassette system with 16K RAM, but cannot be practically upgraded to disk without a minimum of 32K RAM. Other systems may have more or less extensive prerequisites for upgrade, depending on design.

Currently, the 5.25-inch diameter disk is the standard for microcomputers. Other types exist: notably the 8-inch variety used by some high-end, high-capacity micros and, most recently, the 3-inch and 3.5-inch variety. (The typical microcomputer will be incompatible with these.)

Disk drives that are 5.25 inches are manufactured in permutations of the following four classes: **single- and double-sided** (i.e., drives having one or two read/write heads and using one or both sides of a disk) and **single- and double-density** (drives recording sectors at a density of 128 or 256 bytes per second). Thus there are SS/SD drives (single-sided, single-density), SS/DD, DS/SD, and DS/DD drives.

The most common and inexpensive of these are the SS/SD variety, storing up to about 150K, or about 80 to 100 typewritten pages, per disk (sometimes a lot less, depending on the system they are mated to and the specifications of the individual drive), ranging upwards to the DS/DD drives storing about half a **megabyte** (500K), or about 200 to 300 double-spaced pages, per disk. SS/SD drives are available for most microcomputers as the standard upgrade. Which particular combinations are available for your computer depends on its design and the intentions of the manufacturer. Atari, Apple, and IBM have many manufacturer-supported and third-party options available.

Third-Party Drives

Most users will never look beyond the brand name of their computer when shopping for a disk drive. Unwilling-

ness to consider third-party hardware is not necessarily a bad thing in terms of convenience, software compatibility, serviceability, and the assurance of complete system integration. However, if you own a system for which third-party drives are available, you should become aware of what this equipment can offer. Some third-party equipment is better engineered and offers better performance, more storage, and lower prices than manufacturer-supplied hardware. Percom Data and Rana Systems are the leading third-party disk-drive manufacturers. They make drives compatible with Atari, Apple, IBM, and Radio Shack computers (Percom only). Software compatibility is the great bugaboo here—the advanced features of some drives may be inaccessible to software designed with the manufacturer's own equipment in mind, though most advanced drives will function at lower performance levels with software of this type.

The upgrade to disk storage is probably the biggest single after-purchase expenditure many computer buyers ever make. If you are still shopping for a computer, look closely at the comparison between initial and disk-upgraded costs.

WAFFER TAPE DRIVES

Wafer Drives are a form of enhanced cassette mass storage, designed specifically for use with computers. A wafer drive is essentially a high-speed cassette deck. The recording medium is a small, encapsulated, continuous-loop cassette, called a "wafer." It's also known as a **Stringy Floppy**, a brand name of the Exatron Corporation, which was the first to manufacture and market such a device. To date, about 300,000 have been sold.

Wafer drives are inexpensive—some well under \$100—and perform far better than cassettes, though not quite as well as floppy disks. A wafer can store up to about 70K of data, and can be read and written to about 25 times as fast as cassette tape. The tape can be indexed (like a disk), and because it's continuous, the computer can search for any file by simply reading around the tape until it finds it—eliminating the need for manual rewinding and tape-positioning, and permitting computer-controlled operation. Wafer-tape media is much less prone to "dropout" error than cassette reliability.

Software Shortage

With the exception of Coleco's new ADAM computer, however, which was designed around a wafer mass-storage system, no microcomputer currently on the market supports the wafer drive as a suggested peripheral upgrade option. Therefore, though it's possible to interface wafer drives to Timex, Atari, Commodore, Radio Shack, and Apple computers, few software manufacturers are offering products to exploit this peripheral, preferring in-

FLOPPY DISKS AND DRIVES ARE PROBABLY THE BEST COMPROMISE, IN SPEED OF DATA ACCESS, RELIABILITY, CONVENIENCE, AND COST, OF ALL MICROCOMPUTER MASS-STORAGE OPTIONS.

stead to concentrate on the wider market in manufacturer-approved cassette and disk systems.


Suppliers of wafer drives are, however, slowly making progress in providing adaptations of popular software to work in wafer environments. If this trend holds, these devices may, over a limited range of applications, serve as an appealingly economical alternative to floppy disks.

HARD DISK SYSTEMS

If your data-handling requirements exceed the 500K or so that can be conveniently brought on-line with floppy disk, or if you simply want the ultimate in fast mass access, you should—if you can afford to—think about acquiring a fixed or removable hard-disk system. These devices come in various capacities and types, providing anywhere from 5 to 25 megabytes of mass storage.

Fixed-disk drives (sometimes called **Winchester** drives after the old IBM 3030 disk drive—.30 being the caliber of the historic Winchester rifle) are the fastest and most capacious kind of hard disk. The Winchester disk is fixed

permanently in the drive unit within an ultra-clean hermetic chamber. The reason for the isolation is that the technology that allows many megabytes of information to be packed into the Winchester disk also makes the unit extremely vulnerable to contamination of any kind. Spinning at up to 2000 rpm, a read/write head floating on a cushion of air less than 5 microns above the disk's surface, the least particle of dust coming between head and medium can cause catastrophic damage. Winchester-type drives range in price from around \$2,000 to \$10,000.

The second class of hard disk is called a removable hard disk or **disk cartridge drive**. The medium in these drives is an aluminum disk contained in a flat-pack plastic cartridge that provides good (but not perfect) protection from contamination—allowing the disk to be removed from the drive enclosure. Though these devices cannot operate at quite the fine tolerances of sealed Winchesters, they can still provide a healthy 5 to 10 megabytes of storage. Removable hard disk drives start at about \$1,500, ranging upwards of \$5,000 or more. 

COST OF ADDING 1 OR 2 DISK DRIVES TO YOUR COMPUTER

Company	Model	Prerequisites for Disk Drive	Drive Type	Storage Capacity	Price	Controller/Price	Cost of First Drive	Cost of Second Drive
Atari	All	None/32K recommended	ss:sd	90K*	\$449	Intelligent drive	\$449	\$449
Apple	Ile	None	ss:sd	128K	\$325	\$100 card	\$425	\$325
Commodore	VIC-20 C-64	None/memory exp. recommended for VIC-20	ss:sd	170K	\$250	Intelligent drive	\$399/ \$250	\$250
Texas Instruments	TI-99/4A	Peripheral expansion housing. Includes: 48K memory expansion; disk controller card; disk drive	ss:sd	90K	\$550/ whole package	Controller included in system package	\$550	\$500
Radio Shack	Color Computer	OS/9 (DOS); \$69; or, BASIC O/9 (DOS); \$99	ss:dd	150K	\$399	Intelligent drive	\$469 or \$499 (dep. on DOS)	\$279
	TRS-80 Model 4	Memory expansion to 64K; \$149	ss:dd	184K	\$649	Included in memory expansion	\$798	\$239

Key to Chart

ss: single-sided sd: single-density dd: double-density Intelligent: Means that the controller is built-in to the disk drive

*Atari is releasing a new disk drive with 128K storage capacity and a new DOS. Owners of the old Atari DOS may exchange it for the new one, according to the company.

Refunds, Replacements, and Repairs

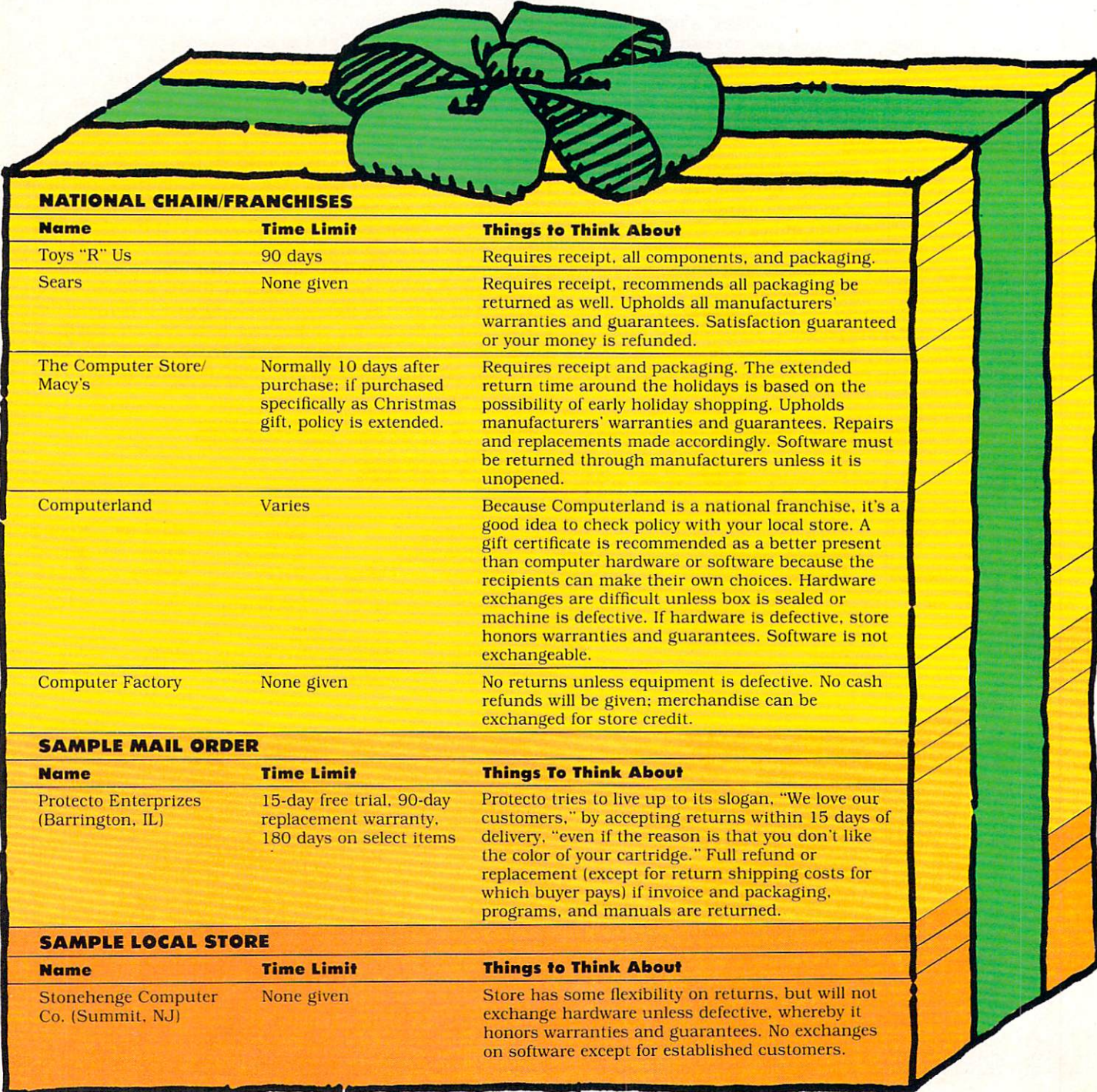
A QUICK SURVEY OF THE INS AND OUTS OF RETURNING COMPUTER HARDWARE AND SOFTWARE

Buying a computer as a gift is an act of great generosity, but it must be done with an equal amount of care. The wise giver of computer hardware and software should make sure that the receiver really wants that particular computer (or peripherals, or program) before going shopping. The alternative is likely to lead to mild-to-prolonged hassles for the recipient who tries to return the merchandise.

The chart below provides an overview of some major computer retailers. (We also included one mail-order firm and one local computer store. Remember: The policies will vary from concern to

concern.) Be sure to check the return, refund, replacement, and repair policy at your local computer store before making any purchase—large or small. In fact, judging from what we were told, it might be easier to exchange a computer than a piece of software. Make certain you, or the gift recipient, save the original packaging; otherwise, the retailer may refuse to exchange the purchase, and the manufacturer may refuse to repair it.

Above all, remember, when in doubt, your best bet is a gift certificate: It makes life simpler for the recipient and for the store with which he or she may be beginning a lifelong relationship.



NATIONAL CHAIN/FRANCHISES		
Name	Time Limit	Things to Think About
Toys "R" Us	90 days	Requires receipt, all components, and packaging.
Sears	None given	Requires receipt, recommends all packaging be returned as well. Upholds all manufacturers' warranties and guarantees. Satisfaction guaranteed or your money is refunded.
The Computer Store/Macy's	Normally 10 days after purchase; if purchased specifically as Christmas gift, policy is extended.	Requires receipt and packaging. The extended return time around the holidays is based on the possibility of early holiday shopping. Upholds manufacturers' warranties and guarantees. Repairs and replacements made accordingly. Software must be returned through manufacturers unless it is unopened.
Computerland	Varies	Because Computerland is a national franchise, it's a good idea to check policy with your local store. A gift certificate is recommended as a better present than computer hardware or software because the recipients can make their own choices. Hardware exchanges are difficult unless box is sealed or machine is defective. If hardware is defective, store honors warranties and guarantees. Software is not exchangeable.
Computer Factory	None given	No returns unless equipment is defective. No cash refunds will be given; merchandise can be exchanged for store credit.
SAMPLE MAIL ORDER		
Name	Time Limit	Things To Think About
Protecto Enterprizes (Barrington, IL)	15-day free trial, 90-day replacement warranty, 180 days on select items	Protecto tries to live up to its slogan, "We love our customers," by accepting returns within 15 days of delivery, "even if the reason is that you don't like the color of your cartridge." Full refund or replacement (except for return shipping costs for which buyer pays) if invoice and packaging, programs, and manuals are returned.
SAMPLE LOCAL STORE		
Name	Time Limit	Things to Think About
Stonehenge Computer Co. (Summit, NJ)	None given	Store has some flexibility on returns, but will not exchange hardware unless defective, whereby it honors warranties and guarantees. No exchanges on software except for established customers.

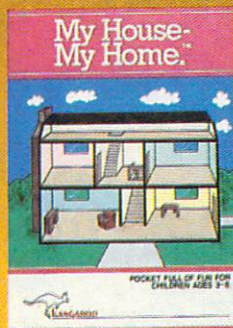
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to look.***

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Jeepers Creatures™ - 30 basic animals with interchangeable heads, torsos, and legs or tails. Create an owligator or an octocatfish or one of over 26,000 funny colorful combinations in this goofy collection of mixed up animals.

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Jeepers Creatures and My House-My Home have no winners or losers, no right or wrong



answers, no high scores to beat, just hundreds of hours of creative play.

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Jeepers Creatures and My House-My Home are each available for \$34.95 at your software dealer or from Kangaroo, Inc., 332 South Michigan Ave. Suite 700, Chicago, IL 60604, (312) 987-9050. Visa, MasterCard and personal checks accepted.



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How to get in touch

**KoalaPad™ Touch Tablet
puts the controls
at your
fingertips.**

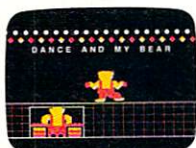
Paint the screen with colorful graphics or play lightning-fast games with just a touch of your finger. The KoalaPad™ Touch Tablet makes using your computer more fun than ever before. Just moving your finger across the special touch-sensitive surface controls graphics, game commands, and much more. It's a great way to get the most out of your computer while you just sit back and



with your computer.

relax. The KoalaPad fits comfortably in the palm of your hand for easy use. And once you have it in

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See the KoalaPad

Touch Tablet at the computer store nearest you. To locate the dealer in your area, call toll free 800-227-6703. (In California, 800-632-7979.)

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Technologies Corporation

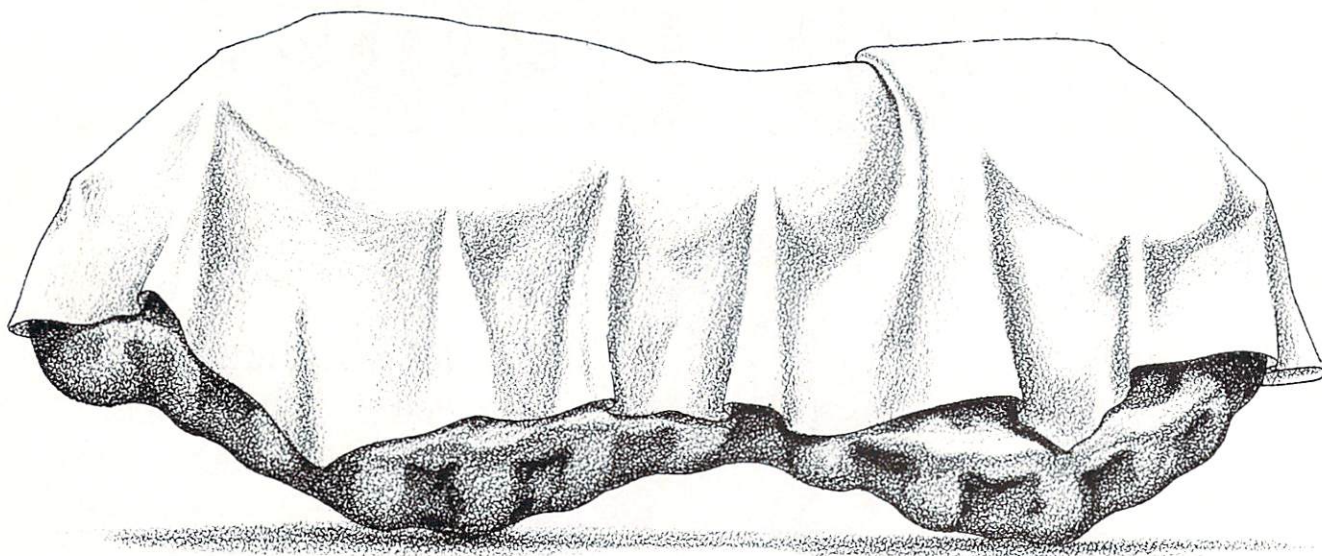
We make computing more personal.™



*Software included with Touch Tablet varies with computer type.

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the PROGRAMMER

LOW RESOLUTION

NEW YEAR'S RESOLUTION

1983

1984

ILLUSTRATION BY BARTON E. STABLER

★

J

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★

NEW YEAR'S PROGRAMS

Page 96

Three programs,
New Year's Eve,
Thank-You Note,
and *Decision Maker*,
to help get
1984 off to a
memorable start.

PUZZLE

Page 122

Follow the lives
of six people from ages
10 to 50,
and try to discover
the one person who
has crossed paths
with all the rest.

READER-WRITTEN PROGRAM

Page 126

Before you go
on that job interview,
use this program
to test
your typing speed
at home.

ILLUSTRATION BY JIM CHERRY III

Cherry

NEW YEAR'S EVE

BY JOEY LATIMER

Let your computer help you celebrate the beginning of 1984! Your micro will be the hit of your New Year's Eve party as it counts the minutes till midnight and then ushers in the new year in a totally "today" way!

[The timer in this program may run a little fast or slow. Try running the program on your computer in advance of New Year's Eve; if you find that the clock is not very accurate, on New Year's Eve you may want to start it running fairly close to midnight.]



ILLUSTRATIONS BY JOSHUA GOSFIELD

Apple/New Year's Eve

```

10 FOR X = 1 TO 250
20 READ A
30 SU = SU + A
40 NEXT X
50 IF SU = 20061 THEN 90
60 PRINT "YOU HAVE MADE AN ERROR WHILE TYPING IN"
70 PRINT "THE DATA STATEMENTS (LINES 5000-5180)"
80 END
90 RESTORE
100 HOME
110 PRINT "TO SET THE COMPUTER CLOCK"
120 PRINT "ANSWER THE FOLLOWING QUESTIONS."
130 PRINT "PLEASE PRESS <RETURN> AFTER EACH REPLY."
150 PRINT "WHAT IS THE HOUR"
160 INPUT "(FROM 1 TO 12)?:",HR
180 IF HR > 12 OR HR < 1 THEN 160
200 PRINT
210 PRINT "HOW MANY MINUTES PAST ";HR;" IS IT"
230 INPUT "(FROM 0 TO 59)?:",MI
250 IF MI > 59 OR MI < 0 THEN 230
270 PRINT
280 PRINT "AND HOW MANY SECONDS PAST ";HR;": ";MI
300 INPUT "(FROM 0 TO 59)?:",SE
320 IF SE > 59 OR SE < 0 THEN 300
400 HOME
450 SE = SE + 1
460 IF SE > 59 THEN MI = MI + 1
470 IF SE > 59 THEN SE = 0
490 IF MI > 59 THEN HR = HR + 1
500 IF MI > 59 THEN MI = 0
520 IF HR > 12 THEN HR = 1
540 IF HR = 11 AND MI = 59 AND SE > 50 THEN 700
570 PRINT HR;": ";MI;": ";SE
610 FOR DE = 1 TO 625
620 NEXT DE
630 GOTO 400
700 HOME
710 GR
720 Y = PEEK(-16302)
730 FOR I = 0 TO 39
740 COLOR= 0
750 VLIN 39,47 AT I
760 NEXT I
770 FOR I = 0 TO 125

```

```

780 READ X
790 POKE 768 + I,X
800 NEXT I
810 GOSUB 3000
820 COLOR= 4
830 CO = 4
840 DIGIT = 1
850 GOSUB 2000
860 DIGIT = DIGIT + 1
870 IF DIGIT <> 2 THEN 950
880 GOSUB 2000
890 FOR A = 10 TO 13
900 VLIN 4,5 AT A
910 VLIN 18,19 AT A
920 NEXT A
930 GOSUB 2000
940 DIGIT = DIGIT + 1
950 IF DIGIT <> 3 THEN 1040
960 GOSUB 2000
970 FOR A = 20 TO 23
980 VLIN 4,5 AT A
990 VLIN 18,19 AT A
1000 VLIN 33,34 AT A
1010 NEXT A
1020 GOSUB 2000
1030 DIGIT = DIGIT + 1
1040 GOSUB 2000
1050 FOR A = 29 TO 30
1060 VLIN 4,17 AT A
1070 NEXT A
1080 FOR A = 31 TO 33
1090 VLIN 16,17 AT A
1100 NEXT A
1110 GOSUB 2000
1120 FOR A = 34 TO 35
1130 VLIN 4,34 AT A
1140 NEXT A
1150 GOSUB 2000
1160 CC = INT(10 * RND(1))
1170 COLOR= CC
1180 ZZ = ZZ + 1
1190 IF CO <> CC THEN 1220
1200 ZZ = ZZ - 1
1210 GOTO 1160
1220 IF ZZ >= 7 AND HL <> YJ THEN 1300
1230 CO = CC
1240 RESTORE
1250 FOR I = 0 TO 125
1260 READ DU
1270 NEXT I
1280 GOTO 840
1300 FOR X = 1 TO 31
1310 READ D,T
1320 IF T <> 2 THEN 1360
1330 FOR I = 0 TO 200
1340 NEXT I
1350 GOTO 1390
1360 POKE 6,40 * D
1370 POKE 8,T
1380 CALL 768
1390 POKE 10,YJ * 17
1400 IF X / 2 = INT(X / 2) THEN CALL 862
1410 IF X = 31 THEN 1440
1420 IF X / 2 <> INT(X / 2) THEN CALL 809
1430 NEXT X
1440 CLEAR
1450 RESTORE
1460 GOTO 700
2000 READ NUM
2010 FOR A = 1 TO NUM
2020 FOR CK = 0 TO 10
2030 Y = PEEK(-16336)
2040 NEXT CK
2050 READ X,Y,Z
2060 VLIN X,Y AT Z
2070 NEXT A
2080 RETURN
3000 POKE 6,6

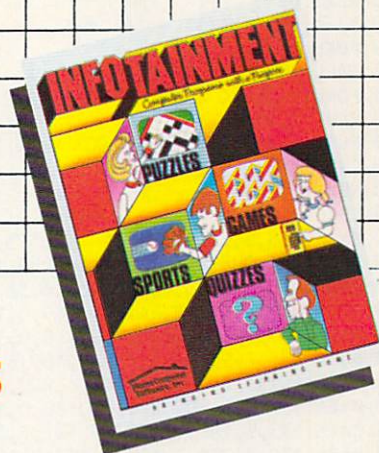
```


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Art Linkletter, known and respected throughout the world for his radio and T.V. work for over 30 years, has brought his famed ability to charm children and their parents to the computer generation.

Here's the first computer program that will make the whole family laugh out loud. You answer Art Linkletter's questions and then watch hilarious stories unfold. It's so different, educational, fun and exciting your kids may not know they're learning! And that's not all!

"Kid's Say" is uniquely designed to include morals to the story teaching many important values such as dealing with your emotions, benefits of laughter, consideration for others, love and many more.

Available on disk for Apple and Commodore 64. Coming soon, Atari and IBM. Suggested retail **\$39.95**

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Combining learning with fun, this arcade-quality program will be a big hit with parents and children alike. It stars PlaqueMan, defender of teeth, in a fast-paced maze game that teaches children the value of good dental hygiene. You control PlaqueMan as he dashes around the screen cleaning the teeth and filling the cavities. But... beware of the evil plaque—only the fluoride can help you. If you're not fast or smart enough to avoid them, you lose.

Comes complete with booklet on proper dental care. Requires a joystick for one or two players. Written by Mike Potter of Protector II fame.

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The most realistic golf strategy game you've ever played because a pro helped design it. Complete with changing weather conditions, contoured greens, power hitting, putting, variable club selection, hooks and slices. It even keeps track of your handicap.

Includes everything but the 19th hole and the greens fees.

Now a foursome can play the 18 toughest holes on the PGA circuit any time of the year, night or day. Features on-screen tips and strategies by Tom Weiskopf, winner of 25 PGA tournaments, to help improve your game on the computer and in real life.

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BRINGING LEARNING HOME

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NEW YEAR'S PROGRAMS

```

3010 POKE 8,20
3020 CALL 795
3030 FOR DE = 0 TO 200
3040 NEXT DE
3050 YJ = INT(RND(1) * 14) + 1
3060 POKE 10,YJ * 17
3070 CALL 809
3080 FOR I = 0 TO 25
3090 POKE 6,10
3100 POKE 8,INT(RND(1) * 200) + 55
3110 CALL 768
3120 NEXT I
3130 RETURN
5000 DATA 165,8,74,133,10,164,8,173,48,192,136,234
5010 DATA 234,208,251,165,7,56,229,10,133,7,176,237
5020 DATA 198,6,208,233,96,166,6,32,0,3,230
5030 DATA 8,134,6,208,247,96,169,0,133,6,133,8,169,4
5040 DATA 133,7,169,59,133,9,160,0,177,6,145,8,200
5050 DATA 208,249,230,7,230,9,169,8,197,7,208,239,169
5060 DATA 4,133,7,165,10,145,6,200,208,251,230,7,169
5070 DATA 8,197,7,208,241,96,160,0,132,6,132,8,169,4
5080 DATA 133,7,169,59,133,9,177,8,145,6,200,208,249
5090 DATA 230,7,230,9,169,8,197,7,208,239,96
5100 DATA 5,4,5,3,33,34,3,4,34,4,4,34,5,33,34,6,2,4
5110 DATA 19,8,4,19,9,4,33,34,13,4,34,14,4,34,15,33
5120 DATA 34,16,2,4,34,18,4,34,19,2,4,34,24,4,34,25,1
5130 DATA 4,5,28,1,33,34,33,1,33,34,36
5140 DATA 2,215,3,160,1,170,2,160,2,128,3,143,1,150,2
5150 DATA 143,1,128,1,143,3,160,1,160,2,128,2,107,5
5160 DATA 95,1,2,2,95,3,107,1,128,2,128,2,160,3,143
5170 DATA 1,150,2,143,1,128,1,143,3,160,1,190,2,190,2
5180 DATA 215,5,160

```

Atari/New Year's Eve

```

100 PRINT CHR$(125)
110 PRINT "TO SET THE COMPUTER CLOCK"
120 PRINT "ANSWER THE FOLLOWING QUESTIONS."
130 PRINT "PLEASE PRESS <ENTER> AFTER"
140 PRINT "EACH REPLY."
150 PRINT "WHAT IS THE HOUR"
160 PRINT "(FROM 1 TO 12)";
170 INPUT HRS
180 IF HRS<1 OR HRS>12 THEN 160
200 PRINT
210 PRINT "HOW MANY MINUTES PAST ";HRS;" IS IT"
230 PRINT "(FROM 0 TO 59)";
240 INPUT MIN
250 IF MIN>59 OR MIN<0 THEN 230
270 PRINT
280 PRINT "AND HOW MANY SECONDS PAST ";HRS;" ";MIN
300 PRINT "(FROM 0 TO 59)"
310 INPUT SEC
320 IF SEC>59 OR SEC<0 THEN 300
400 PRINT CHR$(125)
410 POKE 752,1
420 POKE 20,0
430 IF PEEK(20)<60 THEN 430
440 POKE 20,0
450 SEC=SEC+1
460 IF SEC>59 THEN MIN=MIN+1
470 IF SEC>59 THEN SEC=0
490 IF MIN>59 THEN HRS=HRS+1
500 IF MIN>59 THEN MIN=0
520 IF HRS>12 THEN HRS=1
540 IF HRS=11 AND MIN=59 AND SEC>=55 THEN 700
590 POSITION 13,10
600 PRINT HRS;" ";MIN;" ";SEC;" "
630 GOTO 430
700 POKE 752,0
710 GRAPHICS 3+16
720 GOSUB 3000
730 Z=1
740 HO=CO
750 CO=INT(RND(1)*15)+1
760 IF CO=BA OR CO=HO THEN 750
770 SETCOLOR 0,CO,15
780 COLOR 1

```

```

790 IF Z/2=INT(Z/2) THEN SETCOLOR 1,CO,6
800 IF Z/2=INT(Z/2) THEN COLOR 2
810 READ B,OV,DN
820 IF B=-1 THEN 960
830 FOR T=1 TO B
840 SOUND 0,30,8,10
850 SOUND 0,0,0,0
860 IF Z/3<>INT(Z/3) THEN 920
870 CO=INT(RND(1)*15)+1
880 IF CO=BA THEN 870
890 IF DN/2<>INT(DN/2) THEN COLOR 1
900 IF DN/2=INT(DN/2) THEN SETCOLOR 1,CO,5
910 IF DN/2=INT(DN/2) THEN COLOR 2
920 PLOT OV,DN
930 DN=DN+1
940 NEXT T
950 GOTO 810
960 IF Z>1 THEN GOSUB 3000
970 GOSUB 4000
1300 READ N,DUR
1310 IF N=-1 THEN 1380
1320 SOUND 1,N,10,15
1330 FOR D=1 TO DUR
1340 NEXT D
1350 SOUND 1,0,0,0
1360 GOSUB 4000
1370 GOTO 1300
1380 Z=Z+1
1390 RESTORE
1400 GOTO 740
3000 FOR X=0 TO 151
3010 SOUND 1,X,10,5
3020 FOR D=1 TO 5
3030 NEXT D
3040 NEXT X
3050 SOUND 1,20,8,15
3060 GOSUB 4000
3070 FOR X=1 TO 300
3080 NEXT X
3090 SOUND 1,0,0,0
3100 FOR D=1 TO 100
3110 NEXT D
3120 RETURN
4000 BA=INT(RND(1)*15)+1
4010 SETCOLOR 4,BA,5
4020 RETURN
5000 DATA 2,4,1,2,4,21,22,5,1,22,6,1,2,7,21
5010 DATA 11,9,1,11,10,1,2,11,1,2,11,10,2,12,1
5020 DATA 2,12,10,2,13,1,2,13,10,2,14,1,2,14,10
5030 DATA 2,14,21,22,15,1,22,16,1,2,17,21,22,19,1
5040 DATA 22,20,1,2,21,1,2,21,10,2,21,21,2,22,1
5050 DATA 2,22,10,2,22,21,2,23,1,2,23,10,2,23,21
5060 DATA 2,24,1,2,24,10,2,24,21,22,25,1,22,26,1
5070 DATA 2,28,1,11,29,1,11,30,1,2,31,10,2,32,10
5080 DATA 2,33,10,2,34,10,2,34,21,22,35,1,22,36,1
5090 DATA 2,37,21,-1,-1,-1
5100 DATA 121,50,91,75,96,25,91,50,72,50
5110 DATA 81,75,85,25,81,50,72,25,81,25
5120 DATA 91,75,91,25,72,50,60,50
5130 DATA 53,150,53,50,60,75,72,25,72,50,91,50
5140 DATA 81,75,85,25,81,50,72,25,81,25
5150 DATA 91,75,108,25,108,50,121,50,91,150,-1,-1

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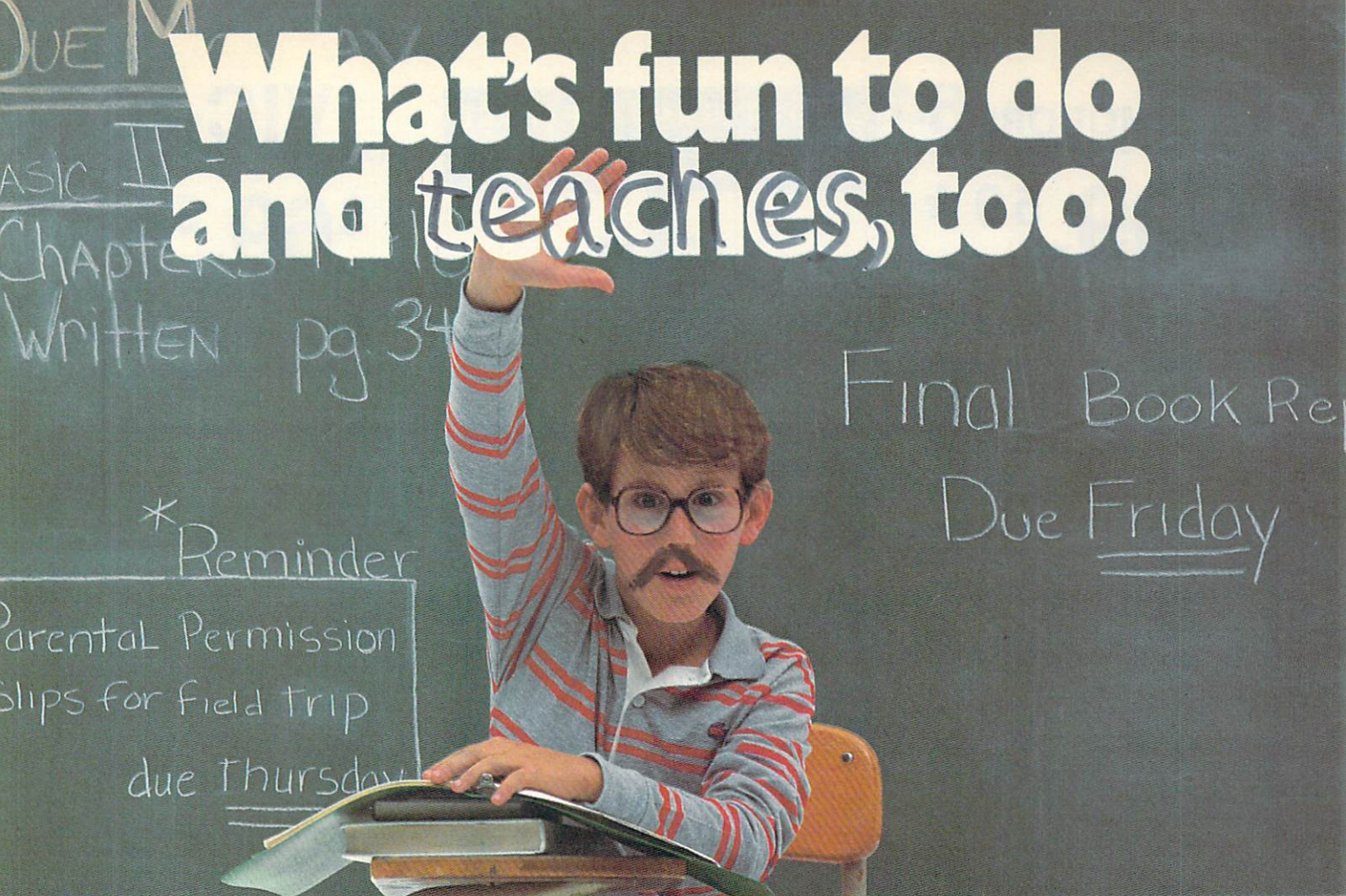
Commodore 64/New Year's Eve

```

10 LF=54272
20 HF=54273
30 PL=54274
40 PH=54275
50 W=54276
60 A=54277
70 S=54278
80 V=54296
90 PRINT CHR$(147)
100 PRINT CHR$(147)
110 PRINT "PLEASE TYPE THE CURRENT TIME"
120 PRINT "IN HOURS, MINUTES, AND SECONDS."
130 PRINT "WHEN COMPLETE, PRESS <RETURN>."

```


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* 170K DISK DRIVE \$159.00

You pay only \$259.00 when you order the 170K Disk Drive! LESS the value of the SPECIAL SOFTWARE COUPON we pack with your disk drive that allows you to SAVE OVER \$100 off software sale prices!! With only \$100 of savings applied, your net disk drive cost is \$159.00.

* TRACTION FRICTION PRINTER \$109.00

You pay only \$209.00 when you order the Comstar T/F deluxe line printer that prints 8 1/2 x 11 full size, single sheet, roll or fan fold paper, labels etc. 40, 66, 80, 132 columns. Impact dot matrix, bi-directional, 80 CPS. LESS the value of the SPECIAL SOFTWARE COUPON we pack with your printer that allows you to SAVE OVER \$100 off software sale prices!! With only \$100 of savings applied your net printer cost is only \$109.00.

80 COLUMN BOARD \$99.00

Now you program 80 COLUMNS on the screen at one time! Converts your Commodore 64 to 80 COLUMNS when you plug in the 80 COLUMN EXPANSION BOARD!! List \$199 SALE \$99 PLUS—you also can get an 80 COLUMN BOARD WORD PROCESSOR with mail merge, terminal emulator, ELECTRONIC SPREAD SHEET. List \$59.00 SALE \$24.95 if purchased with 80 COLUMN BOARD!! (Tape or Disk)

80 COLUMNS IN COLOR

EXECUTIVE WORD PROCESSOR \$69.00

This EXECUTIVE WORD PROCESSOR is the finest available for the COMMODORE 64 computer! The ULTIMATE for PROFESSIONAL Word-processing application! DISPLAYS 40 OR 80 COLUMNS IN COLOR or Black and White! Simple to operate, powerful text editing with a 250 WORD DICTIONARY, complete cursor and insert/delete key controls line and paragraph insertion, automatic deletion, centering, margin settings and output to all printers! Includes a powerful mail merge. List \$99.00 SALE \$69.00. 20,000 WORD DICTIONARY - List \$24.95 SALE \$19.95. EXECUTIVE DATA BASE - List \$89.00 SALE \$59.00. (Disk only).

SPECIAL SOFTWARE COUPON

We pack a SPECIAL SOFTWARE COUPON with every COMMODORE 64 COMPUTER-DISK DRIVE-PRINTER-MONITOR we sell! This coupon allows you to SAVE OVER \$100 OFF SALE PRICES! \$200-\$300 savings are possible!! (example)

PROFESSIONAL SOFTWARE COMMODORE 64

Name	List	Sale	Coupon
Executive Word Processor	\$99.00	\$69.00	\$59.00
Executive Data Base	\$89.00	\$59.00	\$46.00
20,000 Word Dictionary	\$24.95	\$19.95	\$14.95
Electronic Spreadsheet	\$89.00	\$59.00	\$46.00
Accounting Pack	\$69.00	\$49.00	\$32.00
Total \$2			
Word Processor			
Tape	\$69.00	\$56.00	\$37.00
Disk	\$79.95	\$63.00	\$42.00
Total Text 2.6			
Word Processor			
Tape	\$44.95	\$39.00	\$26.00
Disk	\$49.00	\$42.00	\$29.00
Total Label 2.6			
Tape	\$24.95	\$18.00	\$12.00
Disk	\$29.95	\$23.00	\$15.00
Programmers			
Helper (Disk)	\$59.00	\$39.00	\$29.95
Basic Tutor (Tape/Disk)	\$29.95	\$24.95	\$15.00
Typing Teacher (Tape/Disk)	\$29.95	\$24.95	\$15.00
Sprite Designer (Disk)	\$16.95	\$14.95	\$10.00
Medicinenet (Tape)	\$19.95	\$17.95	\$12.00
Weather War II (Tape)	\$19.95	\$17.95	\$12.00
Professional Joy Stick	\$24.95	\$15.95	\$11.00
Light Pen	\$39.95	\$19.95	\$16.95
Dust Cover	\$ 8.95	\$ 6.95	\$ 4.60

(See other items in our catalog!)

Write or call for

Sample SPECIAL SOFTWARE COUPON!

EXECUTIVE QUALITY PROFESSIONAL BUSINESS SOFTWARE

The Cadillac of business programs for Commodore 64 Computers

Item	List	*SALE
Inventory Management	\$99.00	\$59.00
Accounts Receivable	\$99.00	\$59.00
Accounts Payable	\$99.00	\$59.00
Payroll	\$99.00	\$59.00
General Ledger	\$99.00	\$59.00

(*COUPON PRICE \$49.00)

VIC-20 COMPUTER \$69.50

This 25K VIC-20 computer includes a full size 66 key typewriter keyboard color and graphics keys, upper/lower case, full screen editor, 16K level II microsoft basic, sound and music, real time floating point decimal, self teaching book, connects to any T.V. or monitor!

40-80 COLUMN BOARD \$59.00

Now you can get 40 OR 80 COLUMNS on your T.V. or monitor at one time! No more running out of line space for programming and making columns! Just plug in this Expansion Board and you immediately convert your VIC-20 computer to 40 OR 80 COLUMNS!! List \$129. SALE \$59.00. You can also get an 80 COLUMN BOARD WORD PROCESSOR with mail merge, terminal emulator, ELECTRONIC SPREAD SHEET!! List \$59.00. SALE \$24.95 if purchased with 80 COLUMN BOARD!! (Tape or Disk).

32K RAM EXPANDER \$95.00

This cartridge increases programming power over 8 times!! Expands total memory to 57K (57,000 bytes). Block switches are on outside of cover! Has expansion port!! Lists for \$199 (OUR BEST BUY!!)

60K MEMORY EXPANDER \$49.00

Sixslot — Switch selectable — Reset button — Ribbon cable — CARDCO. A must to get the most out of your VIC-20 Computer!

8K RAM CARTRIDGE \$39.00

Increases programming power 2 1/2 times. Expands total memory to 33K (33,000 bytes). Memory block switches are on outside of cover! Includes FREE \$16.95 game.

16K RAM CARTRIDGE \$55.00

Increases programming power 4 times. Expands total memory to 41K (41,000 bytes). Memory block switches are on outside cover! CARDCO Includes FREE \$29.95 adventure game!!

12" GREEN SCREEN MONITOR \$99.00

Excellent quality GREEN PHOSPHOROUS VIDEO MONITOR with ant glare, 1920 characters (80 characters x 24 rows). Save your TV! a must for 80 column word processors. PLUS \$9.95 for VIC 20 or Commodore 64 Cable.

12" AMBER SCREEN MONITOR \$119.00

Premium quality AMBER VIDEO MONITOR With ant glare, (80 characters x 24 rows), exceptionally clear screen, faster scanning. PLUS \$9.95 for VIC 20 or Commodore 64 Cable.

- LOWEST PRICES • 15 DAY FREE TRIAL • 90 DAY FREE REPLACEMENT WARRANTY
- BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

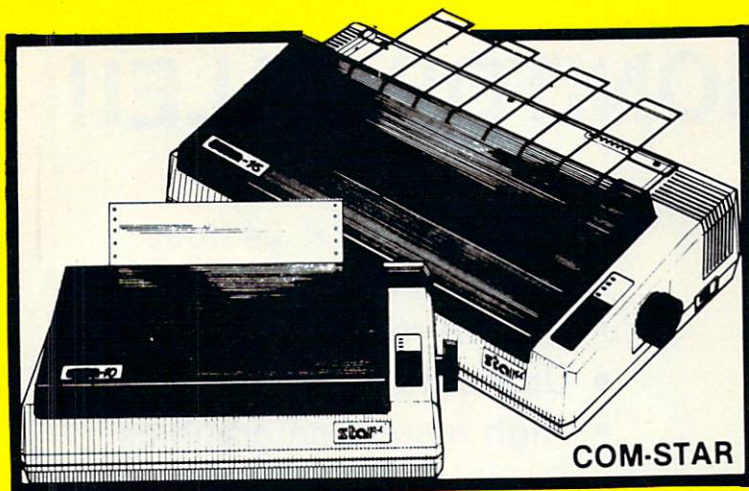
Add \$10.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$20.00 for CANADA, PUERTO RICO, HAWAII orders. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. VISA — MASTER CARD — C.O.D.

PROTECTO ENTERPRISES

(WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order



FANTASTIC PRINTER SALE

as
low
as
\$149⁰⁰

• **15 Day Free Trial - 180 Day Immediate Replacement Warranty**

80 COLUMN THERMAL PRINTER — 60 CPS

Bi-directional, dot matrix, prints 8½" letter size paper, full 80 columns, high resolution graphics, dot bit addressable, special symbols and true decenders! (Centronics parallel interface)

LIST
\$199

SALE
\$149

80 COLUMN TRACTOR-FRICTION PRINTER — 80 CPS

Bi-directional, dot matrix, impact, prints single sheets, continuous feed paper, adjustable columns, 40 to 132 characters! Roll paper adapter \$32.95. (Serial or Centronics parallel interface)

\$399

\$209

PREMIUM QUALITY 10" CARRIAGE T/F PRINTER — 120 CPS

Bi-directional, impact, 9 x 9 dot matrix with double strike for 18 x 18 dot matrix. High resolution bit image (120 x 144 dot matrix) underlining back spacing, left and right margin settings, true lower decenders, with super and sub scripts. Prints standard, italic, block graphics, special characters, plus 24 of user definable characters and much more!! Prints single sheets, continuous feed and roll paper! (Centronics parallel interface)

\$499

\$289

PREMIUM QUALITY 15½" CARRIAGE PRINTER — 120 CPS

Has all the features of the Premium Quality 10" Carriage T/F Printer above plus a 15½" carriage and more powerful electronic components to handle large business forms! (Centronics parallel interface)

\$599

\$379

HIGH SPEED PREMIUM QUALITY T/F 10" PRINTER — 160 CPS

Save printing time with these plus features: 160 CPS speed, 100% duty cycle, 8K buffer diverse character fonts special symbols and true decenders, vertical and horizontal tabs. This is Red Hot Efficiency!!! (Serial or Centronics parallel interface)

\$699

\$499

HIGH SPEED PREMIUM QUALITY T/F 15½" PRINTER — 160 CPS

Has all the features of the 10" Carriage high speed printer plus a 15½" carriage and more powerful electronics to handle larger business forms! (Serial or Centronics parallel interface)

\$799

\$599

PARALLEL PRINTER INTERFACES: (IN STOCK)

- For VIC-20 and COMMODORE 64 **\$49.00**
- For all APPLE COMPUTERS **\$69.00**
- For ATARI 400 and 800 COMPUTERS **\$79.00**

NOTE: Other printer interfaces are available at computer stores!



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ENTERPRIZES (WE LOVE OUR CUSTOMERS)
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WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA.

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SANYO MONITOR SALE!!



9" Data Monitor

- 80 Columns \times 24 lines
- Green text display
- Easy to read - no eye strain
- Up front brightness control
- High resolution graphics
- Quick start - no preheating
- Regulated power supply
- Attractive metal cabinet
- UL and FCC approved

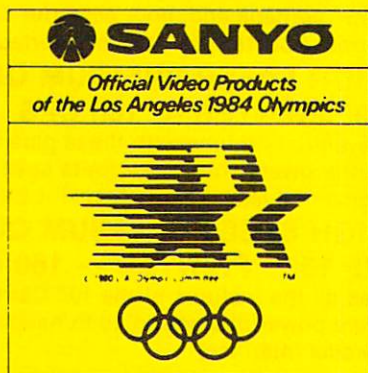
- **15 Day Free Trial - 90 Day Immediate Replacement Warranty**

9" Screen - Green Text Display	\$ 79.00
12" Screen - Green Text Display (anti-reflective screen)	\$ 99.00
12" Screen - Amber Text Display (anti-reflective screen)	\$119.00
14" Screen - Color Monitor (national brand)	\$249.00

Display Monitors From Sanyo

With the need for computing power growing every day, Sanyo has stepped in to meet the demand with a whole new line of low cost, high quality data monitors. Designed for commercial and personal computer use. All models come with an array of features, including up-front brightness and contrast controls. The capacity 5 \times 7 dot characters as the input is 24 lines of characters with up to 80 characters per line.

Equally important, all are built with Sanyo's commitment to technological excellence. In the world of Audio/Video, Sanyo is synonymous with reliability and performance. And Sanyo quality is reflected in our reputation. Unlike some suppliers, Sanyo designs, manufactures and tests virtually all the parts that go into our products, from cameras to stereos. That's an assurance not everybody can give you!



- **LOWEST PRICES • 15 DAY FREE TRIAL • 90 DAY FREE REPLACEMENT WARRANTY**
- **BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS**

Add \$10.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$20.00 for CANADA, PUERTO RICO, HAWAII orders. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. Visa - MasterCard - C.O.D.

PROTECTO ENTERPRISES (WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

VIC 20 40-80 COLUMN BOARD



only \$59⁰⁰



Now you can get 40 or 80 Columns on your T.V. or monitor at one time! No more running out of line space for programming and making columns. Just plug in this board and you immediately convert yur VIC-20 computer to 40 or 80 columns! Comes in an attractive molded case with instructions! List \$129.00. **Sale \$59.00.**

FOR ONLY \$24.95 you can get a 40-80 Column Board "WORD PROCESSOR" with mail merge and terminal emulator PLUS! AN ELECTRONIC SPREAD SHEET (like Visicalc) the word processor requires 8K—mail merge 16K! List \$59.00. **Sale \$39.90.** *If purchased with board only \$24.95. (Tape or Disk.)

WE LOVE OUR CUSTOMERS!



COMMODORE 64 80 COLUMN BOARD \$99⁰⁰



Now you can program 80 columns on the screen at one time! Converts your Commodore 64 to 80 columns when you plug in the PROTECTO 80 Expansion Board List \$199. **Sale \$99.00**

FOR ONLY \$24.95 you can get an 80 Column Board "WORD PROCESSOR" with mail merge and terminal emulator PLUS! AN ELECTRONIC SPREAD SHEET (like Visicalc) List \$59.00. **Sale \$39.90.** *If purchased with board only \$24.95. (Tape or Disk.)

Add \$3.00 for postage. Add \$6.00 for CANADA, PUERTO RICO, HAWAII orders. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. We accept Visa and MasterCard. We ship C.O.D.

**PROTECTO
ENTERPRIZES** (WE LOVE OUR CUSTOMERS)
BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

NEW YEAR'S PROGRAMS

```

140 PRINT "FOR EXAMPLE: ELEVEN FIFTY-FIVE AND"
150 PRINT "ZERO SECONDS WOULD BE"; 115500;"."
160 INPUT "WHAT TIME IS IT NOW";TIS
400 PRINT CHR$(147)
540 IF TIS="115954" THEN 700
590 PRINT CHR$(19)
600 PRINT LEFT$(TIS,2);":";MID$(TIS,3,2);":";RIGHT$(TIS,2)
610 GOTO 540
700 PRINT CHR$(147)
710 GOSUB 3000
720 HL=CO
730 Z=1
740 CO=INT(RND(1)*16)
750 IF CO=BA OR CO=HL THEN 740
760 READ B,LO
770 CH=160
780 IF Z/3=INT(Z/3) THEN CH=81
790 IF Z/5=INT(Z/5) THEN CH=102
800 IF Z/6=INT(Z/6) THEN CH=87
810 IF Z/7=INT(Z/7) THEN CH=83
820 IF Z/8=INT(Z/8) THEN CH=90
830 IF B=-1 THEN 970
840 FOR T=1 TO B
850 POKE LO,CH
860 POKE V,5
870 POKE W,129
880 POKE HF,43
890 POKE LF,52
900 POKE V,0
910 POKE LO+LF,CO
920 LO=LO+40
930 IF Z/2=INT(Z/2) THEN CO=INT(RND(1)*16)
940 IF CO=BA THEN 930
950 NEXT T
960 GOTO 760
970 FOR X=0 TO 24
980 POKE LF+X,0
990 NEXT X
1000 GOSUB 3000
1010 GOSUB 4000
1300 POKE V,8
1310 POKE W,65
1320 POKE A,190
1330 POKE PH,5
1340 POKE PL,5
1350 READ H,L,D
1360 IF H=-1 THEN 1410
1370 POKE HF,H
1380 POKE LF,L
1390 FOR T=1 TO D
1400 NEXT T
1410 POKE HF,0
1420 POKE LF,0
1430 POKE W,0
1440 IF H=-1 THEN 1470
1450 GOSUB 4000
1460 GOTO 1300
1470 Z=Z+1
1480 RESTORE
1490 GOTO 740
3000 POKE V,15
3010 POKE A,172
3020 POKE S,250
3030 FOR X=255 TO 100 STEP -1
3040 POKE HF,X
3050 POKE W,17
3060 FOR D=1 TO 10
3070 NEXT D
3080 NEXT X
3090 POKE HF,15
3100 POKE W,128
3110 GOSUB 4000
3120 FOR T=1 TO 1000
3130 NEXT T
3140 RETURN
4000 BO=INT(RND(1)*16)
4010 BA=INT(RND(1)*16)
4020 IF BA=CO THEN 4010

```

```

4030 POKE 53280,BO
4040 POKE 53281,BA
4050 RETURN
5000 DATA 2,1068,2,1908,23,1069,23,1070,2,1911,12,1073
5010 DATA 12,1074,2,1075,2,1076,2,1077,2,1078,2,1475,2
5020 DATA 1476,2,1477,2,1478,2,1918,23,1079,23,1080,2
5030 DATA 1921,23,1083,23,1084,2,1085,2,1485,2,1925,2
5040 DATA 1086,2,1486,2,1926,2,1087,2,1487,2,1927,2
5050 DATA 1088,2,1488,2,1928,23,1089,23,1090,2,1092,12
5060 DATA 1093,12,1094,2,1495,2,1496,2,1497,2,1937,23
5070 DATA 1098,23,1099,2,1940,-1,-1
5080 DATA 16,195,126,22,96,189,21,31,63,22,96,126,28
5090 DATA 49,126,25,30,189,23,181,63,25,30,126,28,49
5100 DATA 85,25,30,85,22,96,189,22,96,63,28,49,126,33
5110 DATA 135,126,37,162,504,37,162,126,33,135,189,28
5120 DATA 49,63,28,49,126,22,96,126,25,30,189,23,181
5130 DATA 63,25,30,126,28,49,85,25,30,85,22,96,189,18
5140 DATA 209,63,18,209,126,16,195,126,22,96,378
5150 DATA -1,-1,-1

```

VIC-20/New Year's Eve

```

10 S3=36876
20 N=36877
30 V=36878
40 SC=36879
100 PRINT CHR$(147)
110 PRINT "PLEASE INPUT THE TIME"
120 PRINT "IN HOURS, MINUTES AND"
130 PRINT "SECONDS. WHEN DONE,"
140 PRINT "PRESS <RETURN>."
150 PRINT "FOR EXAMPLE, ELEVEN"
160 PRINT "FIFTY-FIVE AND ZERO"
170 PRINT "SECONDS WOULD BE"
180 PRINT 115500;"."
190 PRINT "WHAT TIME IS IT NOW?"
200 INPUT TIS
400 PRINT CHR$(147)
540 IF TIS="115955" THEN 700
590 PRINT CHR$(19)
600 PRINT TAB(7);LEFT$(TIS,2);":";MID$(TIS,3,2);":";RIGHT$(TIS,2)
610 GOTO 540
700 PRINT CHR$(147)
710 GOSUB 3000
720 Z=1
730 HL=CO
740 CO=INT(RND(1)*7)+1
750 IF CO=HL THEN 740
760 READ B,LO
770 IF B=-1 THEN 940
780 CH=32+128
790 IF Z/3=INT(Z/3) THEN CH=81
800 IF Z/5=INT(Z/5) THEN CH=92
810 IF Z/6=INT(Z/6) THEN CH=86+128
820 IF Z/7=INT(Z/7) THEN CH=83
830 IF Z/8=INT(Z/8) THEN CH=90
840 FOR T=1 TO B
850 POKE LO,CH
860 POKE V,10
870 POKE N,128
880 POKE V,0
890 POKE LO+30720,CO
900 LO=LO+22
910 IF Z/2=INT(Z/2) THEN CO=INT(RND(1)*7)+1
920 NEXT T
930 GOTO 760
940 POKE S3,0
950 POKE S3+1,0
960 IF Z>1 THEN GOSUB 3000
970 POKE N,0
980 GOSUB 4000
1300 POKE V,8
1310 READ P,D
1320 IF P=-1 THEN 1360
1330 POKE S3,P
1340 FOR T=1 TO D
1350 NEXT T

```


ONE TOUGH SPELLER.



Time was, Billy would do almost anything to duck his spelling homework.

But since Dad brought home Spellicopter™ by DesignWare,™ Billy has become a spelling ace. As well as an ace chopper pilot.

Because Spellicopter, like all DesignWare software products, combines computer game fun with sound educational principles.

HOW BILLY BUILDS HIS WORD SKILLS.

Each week, Billy or his parents type new spelling words into the Spellicopter game. Then Billy takes command of his chopper and flies a mission through crowded skies, and

mountainous terrain to recover the words. Letter by letter. And always in the right order.

So by the time Billy gets back to the base, he's one proud pilot. And one tough speller.

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If you own an Apple II plus, Apple IIe, IBM-PC, Atari 400, 800 or 1200XL with disk drive, you should take a close look at all the DesignWare software.

Another word game, Crypto Cube™ is a great word puzzle the entire family will enjoy. Once you solve the word puzzles that come with Crypto Cube, you can even build your own.

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You'll be delighted with the way your kids will learn with DesignWare.

And they'll be playing for the fun of it.



DesignWare™

LEARNING COMES ALIVE.

NEW YEAR'S PROGRAMS

```

1360 POKE S3,0
1370 POKE V,0
1380 IF P=-1 THEN 1410
1390 GOSUB 4000
1400 GOTO 1300
1410 Z=Z+1
1420 RESTORE
1430 GOTO 730
3000 POKE V,15
3010 FOR X=253 TO 128 STEP -1
3020 POKE S3,X
3030 FOR D=1 TO 10
3040 NEXT D
3050 NEXT X
3060 POKE S3,15
3070 POKE N,200
3080 GOSUB 4000
3090 FOR T=1 TO 600
3100 NEXT T
3110 FOR T=15 TO 1 STEP -1
3120 POKE V,T
3130 FOR D=1 TO 10
3140 NEXT D
3150 NEXT T
3160 RETURN
4000 CH=INT(RND(1)*8)+1
4010 ON CH GOTO 4020,4030,4040,4050,4060,4070,4080,4090
4020 POKE SC,INT(RND(1)*8)+136:RETURN
4030 POKE SC,INT(RND(1)*8)+152:RETURN
4040 POKE SC,INT(RND(1)*8)+168:RETURN
4050 POKE SC,INT(RND(1)*8)+184:RETURN
4060 POKE SC,INT(RND(1)*8)+200:RETURN
4070 POKE SC,INT(RND(1)*8)+216:RETURN
4080 POKE SC,INT(RND(1)*8)+232:RETURN
4090 POKE SC,INT(RND(1)*8)+248:RETURN
5000 DATA 21,7703,11,7705,1,7706,1,7926
5010 DATA 1,7707,1,7927,1,7708,1,7928
5020 DATA 21,7709,21,7712,1,7713,1,7933
5030 DATA 1,8153,1,7714,1,7934,1,8154
5040 DATA 1,7715,1,7935,1,8155,21,7716
5050 DATA 11,7718,1,7939,1,7940,1,7941
5060 DATA 21,7722,-1,-1
5070 DATA 195,166,210,250,207,83,210,166
5080 DATA 219,166,215,250,212,83,215,166
5090 DATA 219,83,215,83,210,250,210,83,219
5100 DATA 166,225,166,228,500,228,166,225
5110 DATA 183,219,83,219,166,210,166,215
5120 DATA 250,212,83,215,166,219,83,215,83
5130 DATA 210,250,201,83,201,166,195,166
5140 DATA 210,500,0,166,-1,-1

```

TI-99/4A/New Year's Eve

```

10 RANDOMIZE
100 CALL CLEAR
110 PRINT "TO SET THE COMPUTER CLOCK"
120 PRINT "ANSWER THE FOLLOWING"
130 PRINT "QUESTIONS. PLEASE PRESS"
140 PRINT "<ENTER> AFTER EACH REPLY."
150 PRINT "WHAT IS THE HOUR"
160 PRINT "(FROM 1 TO 12)";
170 INPUT HR
180 IF HR>12 THEN 160
190 IF HR<1 THEN 160
200 PRINT
210 PRINT "HOW MANY MINUTES"
220 PRINT "PAST ";HR;" IS IT"
230 PRINT "(FROM 0 TO 59)";
240 INPUT MI
250 IF MI>59 THEN 230
260 IF MI<1 THEN 230
270 PRINT
280 PRINT "AND HOW MANY SECONDS PAST"
290 PRINT HR;":";MI
300 PRINT "(FROM 0 TO 59)";
310 INPUT SE
320 IF SE>59 THEN 300

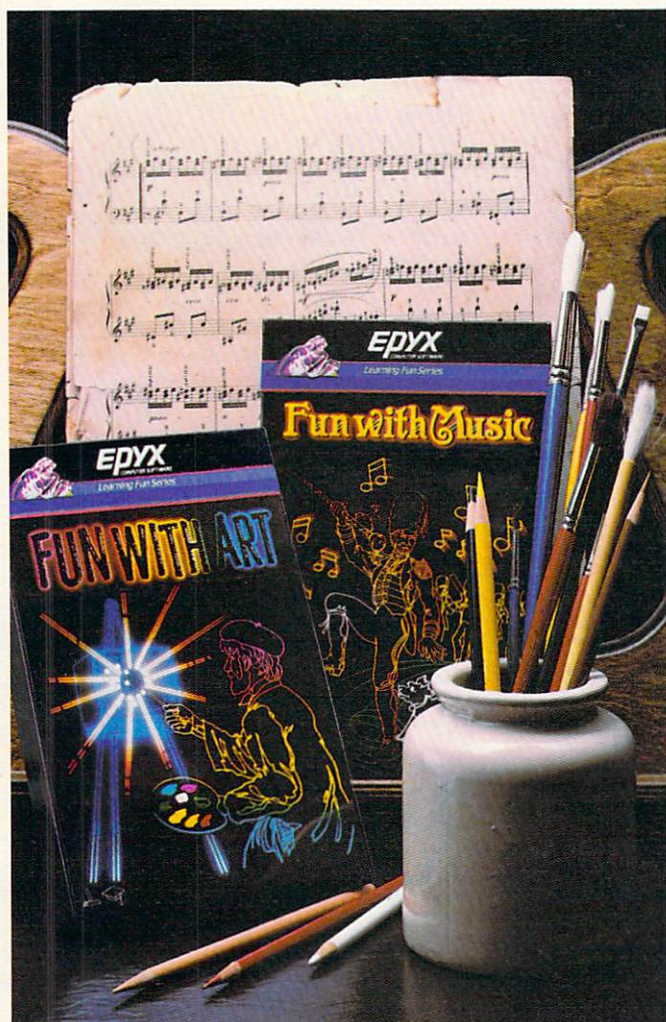
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```

330 IF SE<0 THEN 300
400 CALL CLEAR
450 SE=SE+1
460 IF SE<60 THEN 490
470 SE=0
480 MI=MI+1
490 IF MI<60 THEN 540
500 MI=0
510 HR=HR+1
520 IF HR<13 THEN 540
530 HR=1
540 IF HR<>11 THEN 570
550 IF MI<>59 THEN 570
560 IF SE>53 THEN 700
570 PRINT
580 PRINT
590 PRINT TAB(8);HR;":";MI;":";SE
610 FOR D=1 TO 73
620 NEXT D
630 GOTO 400
700 CALL CLEAR
710 Z=1
720 GOSUB 3000
730 HL=F
740 F=INT(16*RND)+1
750 IF F=HL THEN 740
760 B=INT(16*RND)+1
770 CS=5
780 CH=64
790 READ ROW,COLUMN,REP
800 IF Z/2<>INT(Z/2) THEN 830
810 CH=85
820 CS=7
830 IF Z/3<>INT(Z/3) THEN 860
840 CH=79
850 CS=6
860 IF Z/5<>INT(Z/5) THEN 890
870 CH=42
880 CS=2
890 IF Z/7<>INT(Z/7) THEN 920
900 CH=64
910 CS=8
920 IF Z/9<>INT(Z/9) THEN 950
930 CH=61
940 CS=4
950 IF COLUMN=999 THEN 1030
960 CALL COLOR(CS,F,B)
970 FOR T=1 TO REP
980 CALL VCHAR(ROW,COLUMN,CH)
990 CALL SOUND(-50,-5,15)
1000 ROW=ROW+1
1010 NEXT T
1020 GOTO 790
1030 GOSUB 3000
1040 GOSUB 4000
1300 READ DUR,FRE
1310 IF DUR=999 THEN 1350
1320 CALL SOUND(DUR*125,FRE,20)
1330 GOSUB 4000
1340 GOTO 1300
1350 Z=Z+1
1360 RESTORE
1370 GOTO 730
3000 FOR X=1760 TO 110 STEP -20
3010 CALL SOUND(1,X,15)
3020 NEXT X
3030 CALL SOUND(1000,-6,15)
3040 GOSUB 4000
3050 FOR D=1 TO 250
3060 NEXT D
3070 RETURN
4000 SC=INT(16*RND)+1
4010 CALL SCREEN(SC)
4020 RETURN
5000 DATA 2,5,1,23,5,1,2,6,22,23,7,1,2,9,11,2,10,1,12
5010 DATA 10,1,2,11,1,12,11,1,2,12,1,12,12,1,23,12,1,2
5020 DATA 13,22,23,14,1,2,16,22,2,17,1,12,17,1,23,17,1
5030 DATA 2,18,1,12,18,1,23,18,1,2,19,1,12,19,1,23,19

```


GIVE YOUR KIDS A LESSON THEY'LL NEVER FORGET.



When kids have fun and learn at the same time, they're more likely to remember more of what they've learned. What's more, when they associate the two together — learning becomes an enjoyable activity. So they'll do more of it.

That's the basic principle behind the Learning Fun Series from EPYX.

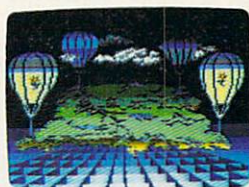
FUN WITH MUSIC. PARENTS TAKE NOTE.

Fun with Music™ is designed to appeal to both you and your children. It comes with a songbook and has two modes of play. In the first mode, you can enter songs from the songbook — or compose your own. Then

play the songs back, adding or removing notes and changing tempo or key. Your computer is like a musical instrument with memory, and you see every note of it displayed on your screen.

The second mode lets you play your song in a fun-filled action game. You control a drum major trying to touch the notes before a small but pesky poodle catches up to him and slows down the parade.

Either way, Fun with Music gives you and your whole family the perfect mix of learning and play.



FUN WITH ART. JUST PICTURE IT.

Creating art on the video screen is one of the newest forms of "high-tech" play for kids. And adults, for that matter. Plus there's nothing to clean up afterwards.

Fun with Art™ uses the computer and joystick to transform your TV screen into an artist's canvas with astonishing results. 128 colors, numerous brush strokes, all kinds of geometric shapes, and special fill-in and magnifying options are some of the 24 different modes and features available to create works of art never before possible.

Fun with Art brings out the artist in you, no matter what your age!

MORE LEARNING FUN ON THE WAY.

These two are the first of an extensive series of Learning Fun games we have planned. Look for these, as well as other EPYX titles, wherever computer software is sold.

 **EPYX**
COMPUTER SOFTWARE
LEARNING FUN SERIES.


```
5040 DATA 1,2,20,22,2,22,1,2,23,11,12,24,1,12,25,1,12
5050 DATA 26,1,23,26,1,2,27,22,23,28,1,999,999,999
5060 DATA 2,262,3,349,1,330,2,349,2,440,3,392,1,370,2
5070 DATA 392,1,440,1,392,3,349,1,349,2,440,2,523,6
5080 DATA 587,2,587,3,523,1,440,2,440,2,349,3,392,1
5090 DATA 370,2,392,1,440,1,392,3,349,1,294,2,294,2
5100 DATA 262,6,349,999,999,999,999,999
```

```

10 SLOW
20 LET Y=1
110 PRINT "TO SET THE COMPUTER CLOCK"
120 PRINT "ANSWER THE FOLLOWING QUESTIONS."
130 PRINT "PLEASE PRESS <ENTER> AFTER"
140 PRINT "EACH REPLY."
150 PRINT "WHAT IS THE HOUR"
160 PRINT "(FROM 1 TO 12)?"
170 INPUT HR
180 IF HR>12 OR HR<1 THEN GOTO 160
200 PRINT
210 PRINT "HOW MANY MINUTES PAST ";HR;" IS IT"
230 PRINT "(FROM 0 TO 59)?"
240 INPUT MI
250 IF MI>59 OR MI<0 THEN GOTO 230
270 PRINT
280 PRINT "AND HOW MANY SECONDS PAST ";HR;" ":";MI"
300 PRINT "(FROM 0 TO 59)?"
310 INPUT SE
320 IF SE>59 OR SE<0 THEN GOTO 300
400 CLS
450 LET SE=SE+2
460 IF SE>59 THEN LET MI=MI+1
470 IF SE>59 THEN LET SE=0
490 IF MI>59 THEN LET HR=HR+1
500 IF MI>59 THEN LET MI=0
520 IF HR>12 THEN LET HR=1
540 IF HR=11 AND MI=59 AND SE>55 THEN GOTO 700
590 PRINT AT 9,10;HR;" : ";MI;" : ";SE;" "
630 GOTO 450
700 CLS
710 PRINT AT 21,7;"**HAPPY NEW YEAR**"
720 LET H0=Y
730 LET Y=INT (16*RND)+1
740 IF Y=H0 THEN GOTO 730
750 IF Y>=8 THEN LET Y=Y+120
760 LET Y$=CHR$ Y
770 PRINT AT 4,3;
780 PRINT Y$;Y$;Y$;TAB 9;
790 PRINT Y$;Y$;Y$;Y$;Y$;Y$;" ";Y$;Y$;Y$;
800 PRINT Y$;Y$;Y$;Y$;Y$;TAB 23;Y$;TAB 28;Y$
810 FOR N=1 TO 5
820 PRINT TAB 5;Y$;TAB 9;Y$;TAB 14;Y$;
830 PRINT " ";Y$;TAB 21;Y$;" ";Y$;TAB 28;Y$
840 NEXT N
850 PRINT TAB 5;Y$;TAB 9;Y$;Y$;
860 PRINT Y$;Y$;Y$;Y$;" ";
870 PRINT Y$;Y$;Y$;Y$;Y$;Y$;" ";
880 PRINT Y$;Y$;Y$;Y$;Y$;Y$
890 FOR N=1 TO 6
900 PRINT TAB 5;Y$;TAB 14;Y$;" ";
910 PRINT Y$;TAB 21;Y$;TAB 28;Y$
920 NEXT N
930 PRINT TAB 3;Y$;Y$;Y$;Y$;Y$;TAB 14;Y$;
940 PRINT " ";Y$;Y$;Y$;Y$;Y$;Y$;TAB 28;Y$
950 FOR N=1 TO 67
960 NEXT N
970 GOTO 720

```

```

100 CLS
110 PRINT "TO SET THE COMPUTER CLOCK,"
120 PRINT "ANSWER THE FOLLOWING QUESTIONS."
130 PRINT "PLEASE PRESS <ENTER> AFTER"
140 PRINT "EACH REPLY."
150 PRINT "WHAT IS THE HOUR"
160 PRINT "(FROM 1 TO 12)";
170 INPUT HR

```

```

5000 DATA 1,36,1,452,14,37,1,454,7,40,1,41,1,233,1,42
5010 DATA 1,234,1,43,1,235,1,459,14,44,1,461,14,47,1
5020 DATA 48,1,240,1,464,1,49,1,241,1,465,1,50,1,242
5030 DATA 1,466,14,51,1,53,7,54,1,247,1,248,1,249,1
5040 DATA 473,14,58,1,475,-1,-1
5050 DATA 89,6,133,9,125,3,133,6,159,6,147,9,140,3
5060 DATA 147,6,159,3,147,3,133,9,133,3,159,6,176,6
5070 DATA 185,18,185,6,176,9,159,3,159,6,133,6,147,9
5080 DATA 140,3,147,6,159,3,147,3,133,9,108,3,108,6
5090 DATA 89,6,133,18,-1,-1

```


THERE'S A COMPUTER BORN EVERY MINUTE... GIVE IT A HOME.

For **\$89.95** with the CS-1632 you can house your computer, peripherals, and accessories without spending a fortune.



The CS-1632 computer storage cabinets compact yet functional design fits almost anywhere while housing your computer monitor, joysticks, software, books and peripherals all for only \$89.95.

The slide out shelf puts the computer at the right height and position for easy comfortable operation.

The fold up locking door keeps unwanted fingers off the key board when not in use.

To store joysticks just turn them upside down and slide them into the inverted storage rack.

Twist tabs on the back of center panel allow for neat concealed grouping of wires, while power packs rest hidden behind center panel on shelf.

The slide out software tray has room for 14 cartridges or cassettes and up to 30 diskettes. Most brands of software will fit between the adjustable partitions with a convenient hook for the spare key at rear.

Stand fits Atari 400 & 800, Commodore 64 & VIC 20, Ti 99/4A and TRS-80.

Cabinet dimensions overall 36" high x 33-7/8" wide x 16" deep.

For those with a large computer family the CS-2748 gives you all the room you need for your computer, monitor, printer, peripherals, software, etc. at a price that's hard to believe: **\$299.95**.



The two slide-out shelves put the keyboard at the proper operating height while allowing easy access to the disk drives.

The bronze tempered glass door protecting the keyboard and disk drives simply lifts up and slides back out of the way during use.

Twist tabs on the back of the center panel allow for neat concealed grouping of wires while a convenient storage shelf for books or other items lies below.

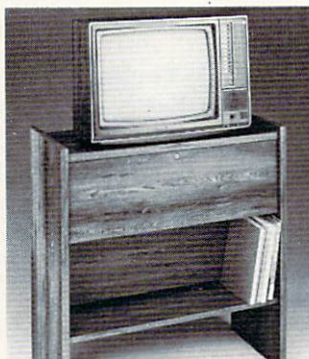
The printer sits behind a fold down door that provides a work surface for papers or books while using the keyboard. The lift up top allows easy access to the top and rear of the printer. A slot in the printer shelf allows for center as well as rear feed printers.

Behind the lower door are a top shelf for paper, feeding the printer, and a bottom shelf to receive printer copy as well as additional storage.

Stand fits same computers as the CS-1632 as well as the Apple I and II, IBM-PC, Franklin and many others.

The cabinet dimensions overall: 39-1/2" high x 49" wide x 27" deep.

Keyboard shelf 20" deep x 26" wide. Disk drive shelf 15-34" deep x 26" wide. Top shelf for monitor 17" deep x 27" wide. Printer shelf 22" deep x 19" wide.



To order CS-1632 send \$89.95 to:

To order CS-2748 send \$299.95 to:

HYTEC
SYSTEMS

P. O. Box 446
West Lynn, OR 97068
For Fast Phone Orders Call Toll Free 1-800-547-3100
Inside Oregon Call (503) 635-6667

Name _____
Address _____
City _____ State _____ Zip _____
Quantity _____ CS-1632 Quantity _____ CS-2748
☐ Golden Oak Finish ☐ Natural walnut finish
☐ My personal check, cashiers check or money order is enclosed.
☐ Bill my VISA # _____ Exp. Date _____
☐ Bill my MasterCard # _____ Exp. Date _____
☐ Please include freight charge on my VISA or MasterCard.

Card Holders Signature _____
Immediate shipment if in stock. If not, allow 3-4 weeks for delivery. If personal check is sent allow additional 2 weeks. CS-1632 ships UPS freight collect from Oregon. CS-2748 ships by truck freight collect from Oregon. Prices subject to change. Shipment subject to availability.

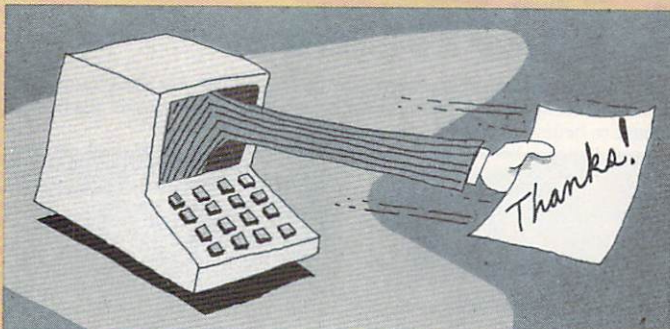
Both the CS-1632 and CS-2748 ship unassembled in two cartons. Assembly requires only a screwdriver, hammer, and a few minutes of your time.
Choice in simulated woodgrain of warm golden oak or rich natural walnut finish.



HYTEC
SYSTEMS

THANK-YOU NOTE

BY JOEY LATIMER



Have you already finished your holiday thank-you notes and dropped them in a mailbox? Or, like a lot of other people, have you shoved your list of people to write into the far reaches of your desk, with the intention of tackling the list "soon"? Does "soon" inevitably arrive mid-March, when you re-discover your long-forgotten list and promptly toss

it in the garbage because "it's too late now"?

Well, if you have a computer and a printer, you have no more excuses. Half your work is already done when you run our *Thank-You Note* program. All you're required to do is answer a few questions, then watch as your printer churns out a personalized thank-you note that can be used year-round.

Commodore 64 & VIC-20/Thank-You Note

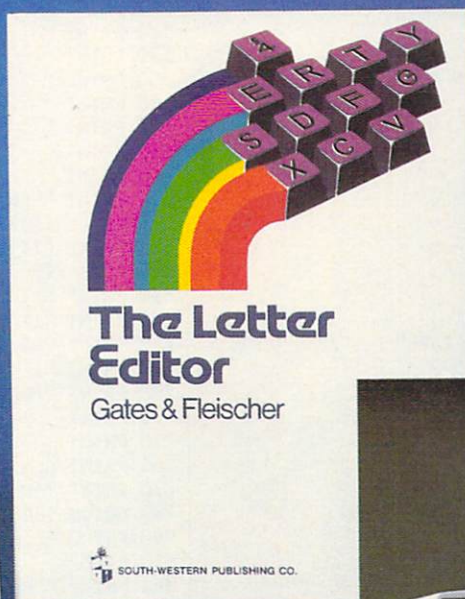
```
50 PRINT CHR$(147)
70 PRINT "THANK-YOU NOTE PROGRAM"
80 PRINT
90 PRINT "PLEASE ANSWER THESE"
100 PRINT "QUESTIONS. PRESS"
110 PRINT "<RETURN> AFTER EACH"
120 PRINT "REPLY."
130 PRINT
140 PRINT "WHOM IS THIS NOTE FOR?"
150 INPUT FOS$
160 PRINT
170 PRINT "WHAT IS YOUR NAME?"
180 INPUT NAS$
190 PRINT
200 PRINT "WHAT GIFT DID YOU"
210 PRINT "RECEIVE?"
220 INPUT GIS$
230 PRINT
240 PRINT "WHAT ADJECTIVE"
250 PRINT "DESCRIBES THE GIFT"
260 PRINT "(E.G., WONDERFUL,"
270 PRINT "GREAT, NEAT)?"
280 INPUT ADJ$
290 PRINT
300 PRINT "IN LESS THAN ONE LINE"
310 PRINT "DESCRIBE WHY YOU LIKE"
320 PRINT "THE GIFT. BECAUSE..."
330 INPUT WH$
340 PRINT
350 PRINT "HOW DO YOU WANT TO"
360 PRINT "CLOSE THE NOTE (E.G., "
370 PRINT "YOURS TRULY)?"
380 INPUT CL$
390 PRINT CHR$(147)
400 PRINT "THANK YOU. PLEASE"
410 PRINT "CHECK YOUR PRINTER,"
420 PRINT "THEN PRESS <RETURN>"
430 PRINT "TO PRINT THE NOTE."
440 INPUT RS$
450 OPEN 4,4
460 CMD4
470 GOSUB 1000
```

```
480 PRINT
490 PRINT "DEAR ";FOS$;"
500 PRINT
510 PRINT
520 PRINT "TTTTT H H A N N K K"
530 PRINT " T H H A A N N K K"
540 PRINT " T H H H H A A A A N N K K"
550 PRINT " T H H A A N N K K"
560 PRINT " T H H A A N N K K"
570 PRINT
580 PRINT " Y Y 000 U U"
590 PRINT " Y Y 0 0 U U"
600 PRINT " Y 0 0 U U"
610 PRINT " Y 0 0 U U"
620 PRINT " Y 000 UUU"
630 PRINT
640 PRINT
650 PRINT "HOW DID YOU KNOW I NEEDED"
660 IF LEN(GIS$)+LEN(ADJ$)>22 THEN 690
670 PRINT GIS$;" IT'S REALLY ";ADJ$;"!!!"
680 GOTO 710
690 PRINT GIS$;"?"
700 PRINT "IT'S REALLY ";ADJ$;"!!!"
710 PRINT WH$;"
720 PRINT "I CAN'T THANK YOU ENOUGH, ";FOS$;"
730 PRINT "FOR YOUR THOUGHTFULNESS."
740 PRINT
750 PRINT
760 PRINT CL$;"
770 PRINT TAB(LEN(CL$)+3);NAS$
780 GOSUB 1000
790 PRINT#4
800 CLOSE 4
810 PRINT CHR$(147)
820 PRINT "PRESS <RETURN> TO"
830 PRINT "MAKE A NEW NOTE."
840 INPUT RS$
850 RUN
1000 FOR T=1 TO 40
1010 PRINT " ";
1020 NEXT T
1030 PRINT
1040 PRINT
1050 RETURN
```

Atari/Thank-You Note

```
10 DIM FOS$(20),NAS$(20),GIS$(38),ADJ$(20),WH$(38),CL$(20)
),SP$(23),RS$(1)
20 SP$=""
30 SP$(23)=SP$
40 SP$(2)=SP$
50 PRINT CHR$(125)
70 PRINT "THANK-YOU NOTE PROGRAM"
80 PRINT
90 PRINT "PLEASE ANSWER EACH QUESTION."
100 PRINT "PRESS <RETURN> AFTER EACH REPLY."
130 PRINT
140 PRINT "WHOM IS THIS NOTE FOR?"
150 INPUT FOS$
160 PRINT
170 PRINT "WHAT IS YOUR NAME?"
180 INPUT NAS$
190 PRINT
200 PRINT "WHAT GIFT DID YOU RECEIVE?"
210 INPUT GIS$
230 PRINT
240 PRINT "WHAT ADJECTIVE DESCRIBES THE GIFT"
250 PRINT "(E.G., WONDERFUL, GREAT, NEAT)?"
260 INPUT ADJ$
290 PRINT
300 PRINT "IN LESS THAN ONE LINE, DESCRIBE WHY"
310 PRINT "YOU LIKE THE GIFT. BECAUSE..."
330 INPUT WH$
340 PRINT
350 PRINT "HOW DO YOU WANT TO CLOSE THE NOTE"
360 PRINT "(E.G., YOURS TRULY, SINCERELY)?"
370 INPUT CL$
390 PRINT CHR$(125)
```


Operating Your Home Computer Is Easy And Fun... With These Two Software Packages From South-Western



KEYBOARDING ALPHA-PAC

This exciting new touch keyboarding program teaches you the keyboard letters—from A to Z—one step at a time, and at your own pace. Through the use of animated graphics, it shows you which fingers should strike which keys and the correct way to position your hands over the keyboard.

The directions, illustrations, exercises, and user input all appear on the display screen. And for handy reference, the keyboard illustration remains on the screen for the first exercises.

When you hit the wrong key, the keyboard automatically locks up until you strike the right key, which flashes on the illustrated keyboard until you do.

This easy-to-use program includes 2 diskettes containing 18 short lessons. The lessons can be completed in no time at all because each one takes only 25 minutes to complete.

Make keyboarding easy with KEYBOARDING ALPHA-PAC—ORDER YOUR PACKAGE TODAY!

THE LETTER EDITOR

In just 4 easy lessons, THE LETTER EDITOR instructs you on the use of the following commands: enter, browse, change, delete, edit, file, help, insert, justify, load, print, replace, set, move, and save.

Once you learn these commands, you can put them to use by revising, correcting, and printing the model letter, provided for your practice.

With these newly acquired commands you and your family will be able to key-in and edit all kinds of reports, essays, term papers, and a hundred other personal letters, business letters and school assignments.

Put your microcomputer to work for you with THE LETTER EDITOR—Order your package today!

Fill out the order form below and return it TODAY!

ORDER FORM

Please send me _____ **KEYBOARDING ALPHA-PAC** diskette package(s) and _____ **THE LETTER EDITOR** diskette package(s) for the following hardware:

- ☐ TRS-80™ Model III or 4, 48K minimum
☐ Apple® 11e, 64K minimum

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
PHONE # () _____

☐ I have enclosed \$59.50 for each **KEYBOARDING ALPHA-PAC** package ordered, plus \$1.50 per item for postage and handling (check or money order*).

☐ I have enclosed \$59.50 for each **LETTER EDITOR** package ordered, plus \$1.50 per item for postage and handling (check or money order*).

☐ Please bill to my MasterCard ☐ Please bill to my VISA

NO. _____

EXPIRATION DATE: _____

SIGNATURE: _____

*Make check or money order payable to:
SOUTH-WESTERN PUBLISHING COMPANY

Mail your order to:

SOUTH-WESTERN PUBLISHING CO., ATTN: Benjamin H. Willard, 5101 Madison Rd., Cincinnati, OH 45227

NEW YEAR'S PROGRAMS

```

400 PRINT "THANK YOU. PLEASE CHECK YOUR PRINTER."
410 PRINT "THEN PRESS <RETURN> TO PRINT THE NOTE."
440 INPUT R$
450 OPEN #7,8,0,"P:"
470 GOSUB 1000
480 PRINT #7
490 PRINT #7;"DEAR ";F0$;"",
500 PRINT #7
510 PRINT #7
520 PRINT #7;"TTTTT H H A N N K K"
530 PRINT #7;" T H H A A N N K K"
540 PRINT #7;" T HHHHH AAAAA N N N K K"
550 PRINT #7;" T H H A A N N N K K"
560 PRINT #7;" T H H A A N N K K"
570 PRINT #7
580 PRINT #7;" Y Y 000 U U"
590 PRINT #7;" Y Y 0 0 U U"
600 PRINT #7;" Y 0 0 U U"
610 PRINT #7;" Y 0 0 U U"
620 PRINT #7;" Y 000 UUU"
630 PRINT #7
640 PRINT #7
650 PRINT #7;"HOW DID YOU KNOW I NEEDED"
660 IF LEN(GI$)+LEN(ADJ$)>22 THEN 690
670 PRINT #7;GI$;"? IT'S REALLY ";ADJ$;"!!!"
680 GOTO 710
690 PRINT #7;GI$;"?"
700 PRINT #7;"IT'S REALLY ";ADJ$;"!!!"
710 PRINT #7;WH$;"."
720 PRINT #7;"I CAN'T THANK YOU ENOUGH, ";F0$;"",
730 PRINT #7;"FOR YOUR THOUGHTFULNESS."
740 PRINT #7
750 PRINT #7
760 PRINT #7;CL$;"",
770 PRINT #7;SP$(1,LEN(CL$)+3);NA$
780 GOSUB 1000
800 CLOSE #7
810 PRINT CHR$(125)
820 PRINT "PRESS <RETURN> TO MAKE A NEW NOTE."
840 INPUT R$
850 RUN
1000 FOR T=1 TO 40
1010 PRINT #7;"*";
1020 NEXT T
1030 PRINT #7
1040 PRINT #7
1050 RETURN

```

ADAM & Apple/Thank You Note

```

50 HOME
70 PRINT "THANK-YOU NOTE PROGRAM"
80 PRINT
90 PRINT "PLEASE ANSWER THESE QUESTIONS."
100 PRINT "PRESS <RETURN> AFTER EACH REPLY."
130 PRINT
140 INPUT "WHOM IS THIS NOTE FOR?";F0$
160 PRINT
170 INPUT "WHAT IS YOUR NAME?";NA$
190 PRINT
200 INPUT "WHAT GIFT DID YOU RECEIVE?";GI$
230 PRINT
240 PRINT "WHAT ADJECTIVE DESCRIBES THE GIFT"
250 INPUT "(E.G., WONDERFUL, GREAT, NEAT)?";ADJ$
290 PRINT
300 PRINT "IN LESS THAN ONE LINE, DESCRIBE"
310 PRINT "WHY YOU LIKE THE GIFT. BECAUSE..."
330 INPUT WH$
340 PRINT
350 PRINT "HOW DO YOU WANT TO CLOSE THE NOTE"
360 INPUT "(E.G., YOURS TRULY, SINCERELY)?";CL$
390 HOME
400 PRINT "THANK YOU. PLEASE CHECK YOUR PRINTER."
410 PRINT "THEN PRESS <RETURN> TO PRINT THE NOTE."
440 INPUT R$
450 PR# 1
470 GOSUB 1000
480 PRINT

```

```

490 PRINT "DEAR ";F0$;"",
500 PRINT
510 PRINT
520 PRINT "TTTTT H H A N N K K"
530 PRINT " T H H A A N N K K"
540 PRINT " T HHHHH AAAAA N N N K K"
550 PRINT " T H H A A N N N K K"
560 PRINT " T H H A A N N K K"
570 PRINT
580 PRINT " Y Y 000 U U"
590 PRINT " Y Y 0 0 U U"
600 PRINT " Y 0 0 U U"
610 PRINT " Y 0 0 U U"
620 PRINT " Y 000 UUU"
630 PRINT
640 PRINT
650 PRINT "HOW DID YOU KNOW I NEEDED"
660 IF LEN(GI$) + LEN(ADJ$) > 22 THEN 690
670 PRINT GI$;"? IT'S REALLY ";ADJ$;"!!!"
680 GOTO 710
690 PRINT GI$;"?"
700 PRINT "IT'S REALLY ";ADJ$;"!!!"
710 PRINT WH$;"."
720 PRINT "I CAN'T THANK YOU ENOUGH, ";F0$;"",
730 PRINT "FOR YOUR THOUGHTFULNESS."
740 PRINT
750 PRINT
760 PRINT CL$;"",
770 PRINT TAB(LEN(CL$) + 3);NA$
780 GOSUB 1000
790 PR# 0
810 HOME
820 PRINT "PRESS <RETURN> TO MAKE A NEW NOTE."
840 INPUT R$
850 RUN
1000 FOR T = 1 TO 40
1010 PRINT "*";
1020 NEXT T
1030 PRINT
1040 PRINT
1050 RETURN

```

Timex Sinclair 1000 w/16K RAM Pack/ Thank-You Note

```

50 CLS
70 PRINT "THANK-YOU NOTE PROGRAM"
80 PRINT
90 PRINT "PLEASE ANSWER THESE QUESTIONS."
100 PRINT "PRESS <ENTER> AFTER EACH REPLY."
130 PRINT
140 PRINT "WHOM IS THIS NOTE FOR?"
150 INPUT F$
160 PRINT
170 PRINT "WHAT IS YOUR NAME?"
180 INPUT N$
190 PRINT
200 PRINT "WHAT GIFT DID YOU RECEIVE?"
210 INPUT G$
230 PRINT
240 PRINT "WHAT ADJECTIVE DESCRIBES THE"
250 PRINT "GIFT (E.G., WONDERFUL, GREAT,"
260 PRINT "NEAT)?"
270 INPUT A$
290 PRINT
300 PRINT "IN LESS THAN ONE LINE, DESCRIBE"
310 PRINT "WHY YOU LIKE THE GIFT."
320 PRINT "BECAUSE..."
330 INPUT W$
340 PRINT
350 PRINT "HOW DO YOU WANT TO CLOSE THE"
360 PRINT "NOTE (E.G., YOURS TRULY,"
370 PRINT "SINCERELY)?"
380 INPUT C$
390 CLS
400 PRINT "THANK YOU. PLEASE CHECK YOUR"
410 PRINT "PRINTER. THEN PRESS <ENTER> TO"
420 PRINT "PRINT THE NOTE."

```



```

430 INPUT R$
470 GOSUB 1000
480 LPRINT
490 LPRINT "DEAR ";F$;","
500 LPRINT
510 LPRINT
520 LPRINT "TTTTT H H A N N K K"
530 LPRINT " T H H A A N N K K"
540 LPRINT " T HHHH AAAAA N N K K"
550 LPRINT " T H H A A N N K K"
560 LPRINT " T H H A A N N K K"
570 LPRINT
580 LPRINT " Y Y 000 U U"
590 LPRINT " Y Y 0 0 U U"
600 LPRINT " Y 0 0 U U"
610 LPRINT " Y 0 0 U U"
620 LPRINT " Y 000 UUU"
630 LPRINT
640 LPRINT
650 LPRINT "HOW DID YOU KNOW I NEEDED"
660 IF LEN G$+LEN A$>22 THEN GOTO 690
670 LPRINT G$;"? IT IS REALLY ";A$;".
680 GOTO 710
690 LPRINT G$;"?"
700 LPRINT "IT IS REALLY ";A$;".
710 LPRINT W$;"."
720 LPRINT "I CANNOT THANK YOU ENOUGH, ";F$;","
730 LPRINT "FOR YOUR THOUGHTFULNESS."
740 LPRINT
750 LPRINT
760 LPRINT C$;"."
770 LPRINT TAB (LEN C$+3);N$
780 GOSUB 1000
810 CLS
820 PRINT "PRESS <ENTER> TO MAKE"
830 PRINT "A NEW NOTE."
840 INPUT R$
850 RUN
1000 FOR T=1 TO 40
1010 LPRINT "*";
1020 NEXT T
1030 LPRINT
1040 LPRINT
1050 RETURN

```

TRS-80 Models I & III/Thank-You Note

```

50 CLS
60 CLEAR 2000
70 PRINT "THANK-YOU NOTE PROGRAM"
80 PRINT
90 PRINT "PLEASE ANSWER THESE QUESTIONS."
100 PRINT "PRESS <ENTER> AFTER EACH REPLY."
130 PRINT
140 INPUT "WHOM IS THIS NOTE FOR";F$
160 PRINT
170 INPUT "WHAT IS YOUR NAME";N$
190 PRINT
200 INPUT "WHAT GIFT DID YOU RECEIVE";G$
230 PRINT
240 PRINT "WHAT ADJECTIVE DESCRIBES THE GIFT"
250 INPUT "(E.G., WONDERFUL, GREAT, NEAT)";ADJ$
290 PRINT
300 PRINT "IN LESS THAN ONE LINE, DESCRIBE"
310 PRINT "WHY YOU LIKE THE GIFT. BECAUSE..."
330 INPUT W$
340 PRINT
350 PRINT "HOW DO YOU WANT TO CLOSE THE NOTE"
360 INPUT "(E.G., YOURS TRULY, SINCERELY)";CL$
390 CLS
400 PRINT "THANK YOU. PLEASE CHECK YOUR PRINTER."
410 PRINT "THEN PRESS <ENTER> TO PRINT THE NOTE."
440 INPUT R$
470 GOSUB 1000
480 LPRINT
490 LPRINT "DEAR ";F$;","
500 LPRINT
510 LPRINT
520 LPRINT "TTTTT H H A N N K K"

```

```

530 LPRINT " T H H A A N N K K"
540 LPRINT " T HHHH AAAAA N N K K"
550 LPRINT " T H H A A N N K K"
560 LPRINT " T H H A A N N K K"
570 LPRINT
580 LPRINT " Y Y 000 U U"
590 LPRINT " Y Y 0 0 U U"
600 LPRINT " Y 0 0 U U"
610 LPRINT " Y 0 0 U U"
620 LPRINT " Y 000 UUU"
630 LPRINT
640 LPRINT
650 LPRINT "HOW DID YOU KNOW I NEEDED"
660 IF LEN(G$)+LEN(ADJ$)>22 THEN 690
670 LPRINT G$;"? IT'S REALLY ";ADJ$;"!!!"
680 GOTO 710
690 LPRINT G$;"?"
700 LPRINT "IT'S REALLY ";ADJ$;"!!!"
710 LPRINT W$;"."
720 LPRINT "I CAN'T THANK YOU ENOUGH, ";F$;","
730 LPRINT "FOR YOUR THOUGHTFULNESS."
740 LPRINT
750 LPRINT
760 LPRINT CL$;"."
770 LPRINT TAB(LEN(CL$)+3);N$
780 GOSUB 1000
810 CLS
820 PRINT "PRESS <ENTER> TO MAKE A NEW NOTE."
840 INPUT R$
850 RUN
1000 LPRINT STRING$(40,"*")
1040 LPRINT
1050 RETURN

```

MODIFICATIONS FOR OTHER COMPUTERS

IBM PC/Thank-You Note

Use the Model III version, except omit line 60.

TI-99/4A/Thank-You Note

Use the Commodore 64 and VIC-20 version with the following alterations: Replace PRINT CHR\$(147) in lines 50, 390, and 810 with CALL CLEAR. Change lines 480, 500, 510, 570, 630, 640, 740, 750, 1030, and 1040 to read PRINT #1

In lines 490, 520-560, 580-620, 650, 670, 690-730, 760, 770, and 1010, change PRINT to

PRINT #1:

Finally, omit lines 460 and 790 and change lines 450, 800, and 850 to read

```

450 OPEN #1:"PIO"
800 CLOSE #1
850 GOTO 50

```

TRS-80 Color Computer/Thank-You Note

Use the Commodore 64 and VIC-20 version with the following alterations: Replace PRINT CHR\$(147) in lines 50, 390, and 810 with CLS. Omit lines 450, 460, 790, and 800. In lines 480, 500, 510, 570, 630, 640, 740, 750, 1030, and 1040, replace PRINT with

PRINT#-2

Finally, in lines 490, 520-560, 580-620, 650, 670, 690-730, 760-770, and 1010, replace PRINT with

PRINT#-2,

For example, line 490 becomes

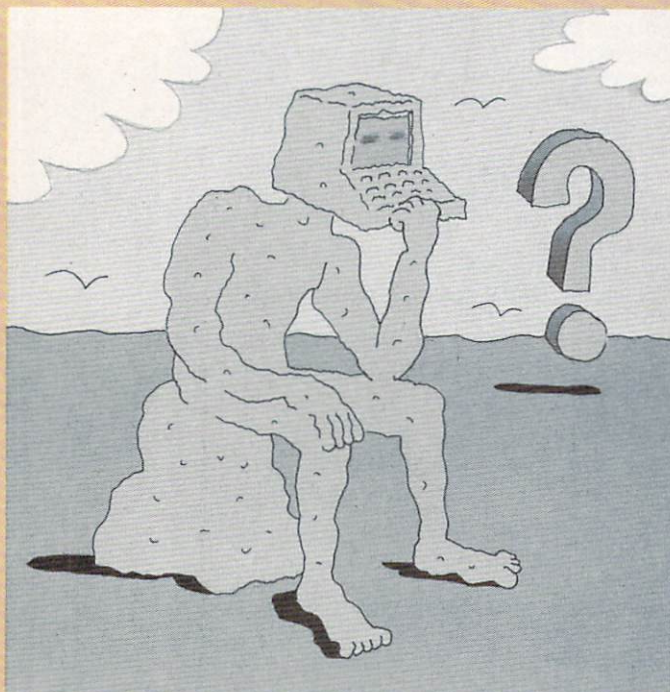
```

490 PRINT#-2, "DEAR ";F$;","

```


DECISION MAKER

BY JOEY LATIMER



Nobody's perfect, but some of us are less perfect than others and may have a hard time deciding which bad habit should be the focus of our New Year's resolution for 1984. Run *Decision Maker*, and let your computer help you decide!

First you will be asked to provide a list of options you're trying to choose among—in this case, possible New Year's resolutions. Let's say you give two: "stop overeating" and "be more punctual." Next you will be asked to provide a list of factors that will influence your decision. Let's say you input only two: health and money.

You will then be asked to rate the relative importance of each factor on a scale of 1 (lowest) to 10 (highest). If on your recent 85th birthday you came into a great inheritance, you might rate money a 1 but because of your age give health an 8.

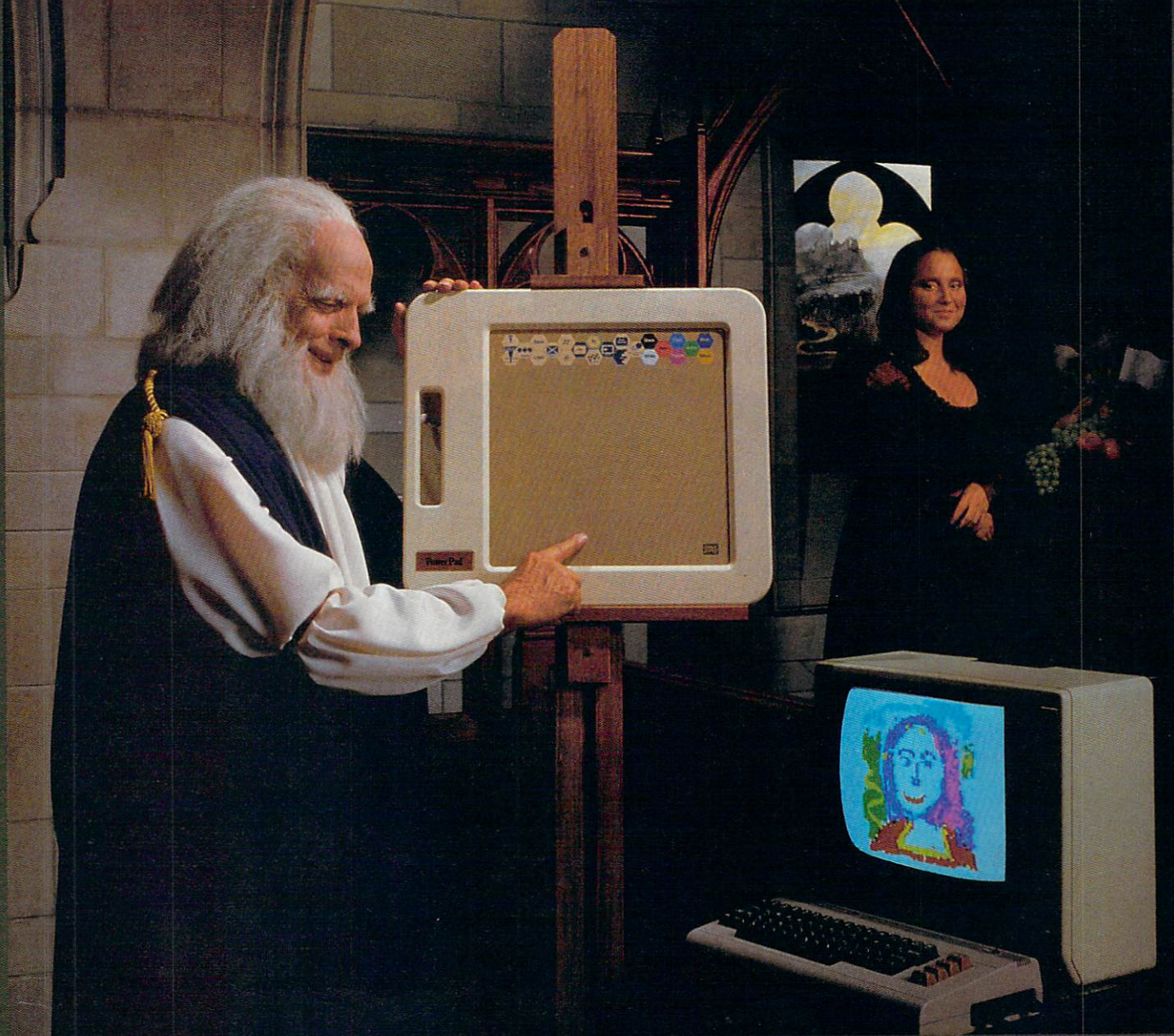
Next you will be asked to rate each option ("stop overeating" and "be more punctual") on the basis of each factor. You might rate "stop overeating" a 2 for health because you're not that fat, but a 7 for money because all those candy bars add up. And you might give punctuality a 4 for health, just because you feel tense as you race to an overdue appointment, and a 9 for money, because you may lose your job unless you start coming in on time.

Even if you choose not to accept the computer's conclusion, *Decision Maker* is a handy way for you to define all the factors that are important to making a particular decision. The program can be used for a variety of decisions, all the way from determining which job to take to what room to redecorate, or which computer peripheral to buy!

Base Version (VIC-20)/Decision Maker

```
10 PRINT CHR$(147)
30 DIM I(10,10)
120 PRINT "DECISION MAKER"
130 PRINT
140 PRINT "PLEASE TYPE A LIST "
150 PRINT "OF THE OPTIONS YOU "
```

```
160 PRINT "ARE CONSIDERING. "
170 PRINT "ANY ORDER WILL DO. "
180 GOSUB 2000
190 C=1
200 D$="DONE"
210 INPUT A$(C)
240 IF A$(C)=D$ THEN 300
250 C=C+1
290 GOTO 210
300 TA=C-1
310 PRINT CHR$(147)
320 PRINT "PLEASE TYPE A LIST "
330 PRINT "OF FACTORS THAT ARE "
340 PRINT "IMPORTANT IN MAKING "
350 PRINT "THIS DECISION."
360 GOSUB 2000
370 C=1
380 INPUT F$(C)
410 IF F$(C)=D$ THEN 470
450 C=C+1
460 GOTO 380
470 TF=C-1
480 PRINT CHR$(147)
490 PRINT "PLEASE RATE THE "
500 PRINT "RELATIVE IMPORTANCE "
510 PRINT "OF EACH FACTOR ON A "
520 PRINT "SCALE OF 1 TO 10 (10 "
530 PRINT "BEING THE HIGHEST)."
540 GOSUB 3000
550 FOR C=1 TO TF
560 PRINT
570 PRINT F$(C);
580 INPUT RF(C)
590 IF RF(C)<1 OR RF(C)>10 THEN 580
610 NEXT C
620 FOR C=1 TO TA
630 PRINT CHR$(147)
640 PRINT "PLEASE RATE, ON A "
650 PRINT "SCALE OF 1 TO 10, "
660 PRINT "THE AMOUNT EACH "
670 PRINT "FACTOR SUPPORTS "
680 PRINT "CHOOSING THE OPTION"
690 PRINT
700 PRINT A$(C)
710 GOSUB 3000
720 PRINT "WHAT IS THE RATING "
730 PRINT "OF ";A$(C)
740 PRINT "FOR THE FACTOR ..."
750 FOR IC=1 TO TF
760 PRINT
770 PRINT F$(IC);
780 INPUT I(C,IC)
790 IF I(C,IC)<1 OR I(C,IC)>10 THEN 780
800 NEXT IC
830 NEXT C
840 PRINT CHR$(147)
850 PRINT "CALCULATING RESULTS"
860 FOR C=1 TO TA
870 FOR IC=1 TO TF
880 TR(C)=TR(C)+I(C,IC)*RF(IC)
890 NEXT IC
900 NEXT C
910 W=1
920 FOR C=2 TO TA
930 IF TR(C)>TR(W) THEN W=C
950 NEXT C
960 POKE 36878,3
970 POKE 36874,240
980 FOR D=1 TO 500
990 NEXT D
1000 POKE 36874,0
1030 PRINT CHR$(147)
1040 PRINT A$(W)
1050 PRINT "HAD THE HIGHEST "
1060 PRINT "OVERALL RATING WITH "
1070 PRINT TR(W); " POINTS."
1080 PRINT
1090 PRINT "THE OTHER OPTIONS "
```

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NEW YEAR'S PROGRAMS

```

1100 PRINT "RATED AS FOLLOWS:"
1110 PRINT
1120 FOR C=1 TO TA
1130 IF C=W THEN 1150
1140 PRINT TR(C),A$(C)
1150 NEXT C
1160 END
2000 GOSUB 3000
2010 PRINT "TYPE THE WORD ";CHR$(34);"DONE";CHR$(34);" "
2020 PRINT "AND PRESS <RETURN> "
2030 PRINT "WHEN YOU HAVE "
2040 PRINT "FINISHED TYPING THE "
2050 PRINT "LIST."
2060 PRINT
2070 RETURN
3000 PRINT
3010 PRINT "PRESS <RETURN> AFTER "
3020 PRINT "EACH ENTRY."
3030 RETURN

```

Atari/Decision Maker

```

10 PRINT CHR$(125)
30 DIM A$(400),F$(400),AP(10,2),FP(10,2),L$(40),RF(10)
,I(10,10),TR(10),R$(1),D$(4)
90 FOR X=0 TO 10
100 TR(X)=0
110 NEXT X
120 PRINT "DECISION MAKER"
130 PRINT
140 PRINT "PLEASE TYPE A LIST OF THE"
150 PRINT "OPTIONS YOU ARE CONSIDERING."
160 PRINT "ANY ORDER WILL DO."
180 GOSUB 2000
190 C=1
200 D$="DONE"
210 INPUT L$
240 IF L$=D$ THEN 300
250 AP(C,1)=LEN(A$)+1
260 A$(AP(C,1))=L$
270 AP(C,2)=LEN(A$)
280 C=C+1
290 GOTO 210
300 TA=C-1
310 PRINT CHR$(125)
320 PRINT "PLEASE TYPE A LIST OF"
330 PRINT "FACTORS THAT ARE IMPORTANT"
340 PRINT "IN MAKING THIS DECISION"
360 GOSUB 2000
370 C=1
380 INPUT L$
410 IF L$=D$ THEN 470
420 FP(C,1)=LEN(F$)+1
430 F$(FP(C,1))=L$
440 FP(C,2)=LEN(F$)
450 C=C+1
460 GOTO 380
470 TF=C-1
480 PRINT CHR$(125)
490 PRINT "PLEASE RATE THE RELATIVE IMPORTANCE"
500 PRINT "OF EACH FACTOR ON A SCALE OF 1 TO 10"
510 PRINT "(10 BEING THE HIGHEST)."
540 GOSUB 3000
550 FOR C=1 TO TF
560 PRINT
570 PRINT F$(FP(C,1),FP(C,2))
580 INPUT L
590 IF L<1 OR L>10 THEN 580
600 RF(C)=L
610 NEXT C
620 FOR C=1 TO TA
630 PRINT CHR$(125)
640 PRINT "PLEASE RATE, ON A SCALE OF 1 TO 10,"
650 PRINT "THE AMOUNT EACH FACTOR SUPPORTS"
660 PRINT "CHOOSING THE OPTION"
670 PRINT
700 PRINT A$(AP(C,1),AP(C,2))
710 GOSUB 3000
720 PRINT "WHAT IS THE RATING OF"

```

```

730 PRINT A$(AP(C,1),AP(C,2))
740 PRINT "FOR THE FACTOR"
750 FOR IC=1 TO TF
760 PRINT
770 PRINT F$(FP(IC,1),FP(IC,2));
780 INPUT L
790 IF L<1 OR L>10 THEN 780
810 I(C,IC)=L
820 NEXT IC
830 NEXT C
840 PRINT CHR$(125)
850 PRINT "CALCULATING RESULTS"
860 FOR C=1 TO TA
870 FOR IC=1 TO TF
880 TR(C)=TR(C)+I(C,IC)*RF(IC)
890 NEXT IC
900 NEXT C
910 W=1
920 FOR C=2 TO TA
930 IF TR(C)>TR(W) THEN W=C
950 NEXT C
960 PRINT CHR$(253)
1030 PRINT CHR$(125)
1040 PRINT A$(AP(W,1),AP(W,2))
1050 PRINT "HAD THE HIGHEST OVERALL RATING WITH"
1060 PRINT TR(W);" POINTS."
1080 PRINT
1090 PRINT "THE OTHER OPTIONS RATED AS FOLLOWS:"
1120 FOR C=1 TO TA
1130 IF C=W THEN 1150
1140 PRINT TR(C),A$(AP(C,1),AP(C,2))
1150 NEXT C
1160 END
2000 GOSUB 3000
2010 PRINT "TYPE THE WORD ";CHR$(34);"DONE";CHR$(34);"
AND PRESS"
2020 PRINT "<RETURN> WHEN YOU HAVE FINISHED"
2030 PRINT "TYPING THE LIST."
2060 PRINT
2070 RETURN
3000 PRINT
3010 PRINT "PRESS <RETURN> AFTER EACH ENTRY."
3030 RETURN

```

Timex Sinclair 1000 w/16K RAM Pack/ Decision Maker

```

10 CLS
30 DIM A$(10,32)
40 DIM F$(10,32)
50 DIM L$(32)
60 DIM I(10,10)
70 DIM R(10)
80 DIM T(10)
120 PRINT "DECISION MAKER"
130 PRINT
140 PRINT "PLEASE TYPE A LIST OF THE"
150 PRINT "OPTIONS YOU ARE CONSIDERING."
160 PRINT "ANY ORDER WILL DO."
180 GOSUB 2000
190 LET C=1
200 LET D$="DONE"
210 INPUT A$(C)
230 PRINT A$(C)
240 IF A$(C, TO 4)=D$ THEN GOTO 300
280 LET C=C+1
290 GOTO 210
300 LET TA=C-1
310 CLS
320 PRINT "PLEASE TYPE A LIST OF FACTORS"
330 PRINT "THAT ARE IMPORTANT IN MAKING"
340 PRINT "THIS DECISION."
360 GOSUB 2000
370 LET C=1
380 INPUT F$(C)
400 PRINT F$(C)
410 IF F$(C, TO 4)=D$ THEN GOTO 470
450 LET C=C+1

```


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NEW YEAR'S PROGRAMS

```

460 GOTO 380
470 LET TF=C-I
480 CLS
490 PRINT "PLEASE RATE THE RELATIVE"
500 PRINT "IMPORTANCE OF EACH FACTOR ON A"
510 PRINT "SCALE OF 1 TO 10"
520 PRINT "(10 BEING THE HIGHEST)."
540 GOSUB 3000
550 FOR C=1 TO TF
560 PRINT
570 PRINT F$(C)
580 INPUT R(C)
590 R(C)<1 OR R(C)>10 THEN GOTO 580
610 NEXT C
620 FOR C=1 TO TA
630 CLS
640 PRINT "PLEASE RATE, ON A SCALE OF"
650 PRINT "1 TO 10, THE AMOUNT EACH FACTOR"
670 PRINT "SUPPORTS CHOOSING THE OPTION"
690 PRINT
700 PRINT A$(C)
710 GOSUB 3000
720 PRINT "WHAT IS THE RATING OF"
730 PRINT A$(C)
740 PRINT "FOR THE FACTOR..."
750 FOR J=1 TO TF
760 PRINT
770 PRINT F$(J);"?"
780 INPUT I(C,J)
790 IF I(C,J)<1 OR I(C,J)>10 THEN GOTO 780
820 NEXT J
830 NEXT C
840 CLS
850 PRINT "CALCULATING RESULTS..."
860 FOR C=1 TO TA
870 FOR J=1 TO TF
880 LET T(C)=T(C)+I(C,J)*R(J)
890 NEXT J
900 NEXT C
910 LET W=1
920 FOR C=2 TO TA
930 IF T(C)>T(W) THEN LET W=C
950 NEXT C
1030 CLS
1040 PRINT A$(W)
1050 PRINT "HAD THE HIGHEST OVERALL"
1060 PRINT "RATING WITH ";T(W);" POINTS."
1080 PRINT
1090 PRINT "THE OTHER OPTIONS RATED"
1100 PRINT "AS FOLLOWS:"
1110 PRINT
1120 FOR C=1 TO TA
1130 IF C=W THEN GOTO 1150
1140 PRINT T(C),A$(C)
1150 NEXT C
1160 STOP
2000 GOSUB 3000
2010 PRINT "TYPE THE WORD ""DONE"" AND"
2020 PRINT "PRESS <ENTER> WHEN YOU HAVE"
2030 PRINT "FINISHED TYPING THE LIST."
2060 PRINT
2070 RETURN
3000 PRINT
3010 PRINT "PRESS <ENTER> AFTER EACH ENTRY."
3030 RETURN

```

MODIFICATIONS FOR OTHER COMPUTERS

ADAM & Apple/Decision Maker

Use the base version, with the following alterations:
Change PRINT CHR\$(147) to HOME in lines 10, 310, 480, 630, 840, and 1030. Omit lines 990 and 1000. Change lines 960-980 to read

```

960 FOR B = 1 TO 4
970 PRINT CHR$(7)
980 NEXT B

```

Finally, add a semicolon to the end of lines 140, 160,

320, 340, 490, 510, 640-660, 1050, 1090, 2010, 2030, 2040, and 3010. For example, line 140 should look like this:

```
140 PRINT "PLEASE TYPE A LIST ";
```

Commodore 64/Decision Maker

Use the base version, with the following alterations:

Change lines 960-1000 to read

```

960 POKE 54296,15
970 POKE 54278,228
980 POKE 54273,57
990 POKE 54276,33
1000 FOR T = 1 TO 200

```

Add lines 1010 and 1020:

```

1010 NEXT T
1020 POKE 54276,0

```

Finally, add a semicolon to the end of lines 140, 160, 320, 340, 490, 510, 640-660, 1050, 1090, 2010, 2030, 2040, and 3010.

IBM PC/Decision Maker

Use the base version, with the following alterations:

Change PRINT CHR\$(147) to CLS in lines 10, 310, 480, 630, 840, and 1030. Change line 960 to read

```
960 BEEP
```

Omit lines 970-1000. Finally, add a semicolon to the end of lines 140-160, 320-340, 490-510, 640-660, 1050, 1060, 1090, 2010-2040, and 3010.

TI-99/4A/Decision Maker

Use the base version, with the following alterations:

Change PRINT CHR\$(147) to CALL CLEAR in lines 10, 310, 480, 630, 840, and 1030. Change <RETURN> to <ENTER> in lines 2020 and 3010. Omit lines 970-1000. Change lines 590, 790, 930, and 960 to read

```

590 IF RF(C)<1 THEN 580
790 IF I(C,IC)<1 THEN 780
930 IF TR(C)<=TR(W) THEN 950
960 CALL SOUND(300,131,5)

```

Finally, add lines 600, 800, and 940:

```

600 IF RF(C)>10 THEN 580
800 IF I(C,IC)>10 THEN 780
940 W=C

```

TRS-80 Color Computer/Decision Maker

Use the base version, with the following alterations:

Change PRINT CHR\$(147) to CLS in lines 10, 310, 480, 630, 840, and 1030. Change <RETURN> to <ENTER> in lines 2020 and 3010. Omit lines 970-1000. Change line 960 to read

```
960 SOUND 20,10
```

Add line 20:

```
20 CLEAR 1000
```

Finally, add a semicolon to the end of lines 640, 650, and 2040.

TRS-80 Models I & III/Decision Maker

Use the base version, with the following alterations:

Change PRINT CHR\$(147) to CLS in lines 10, 310, 480, 630, 840, and 1030. Change <RETURN> to <ENTER> in lines 2020 and 3010. Omit lines 960-1000. Add line 20:

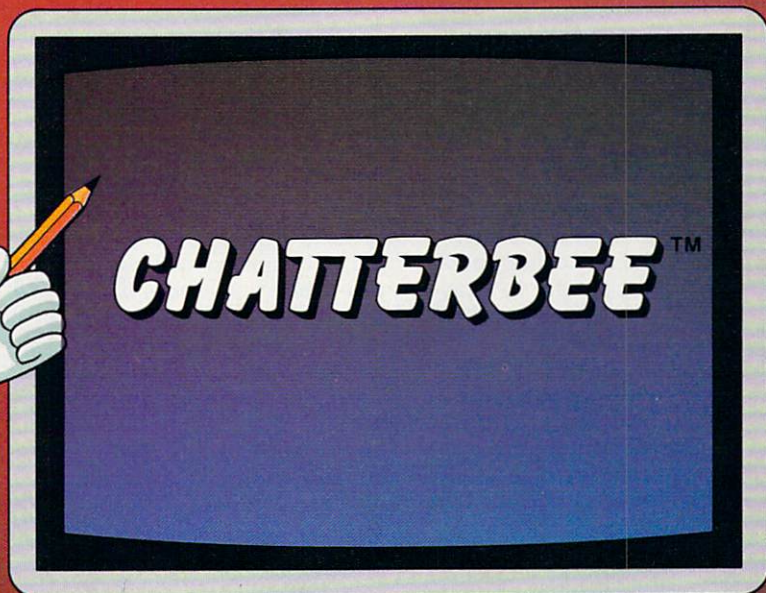
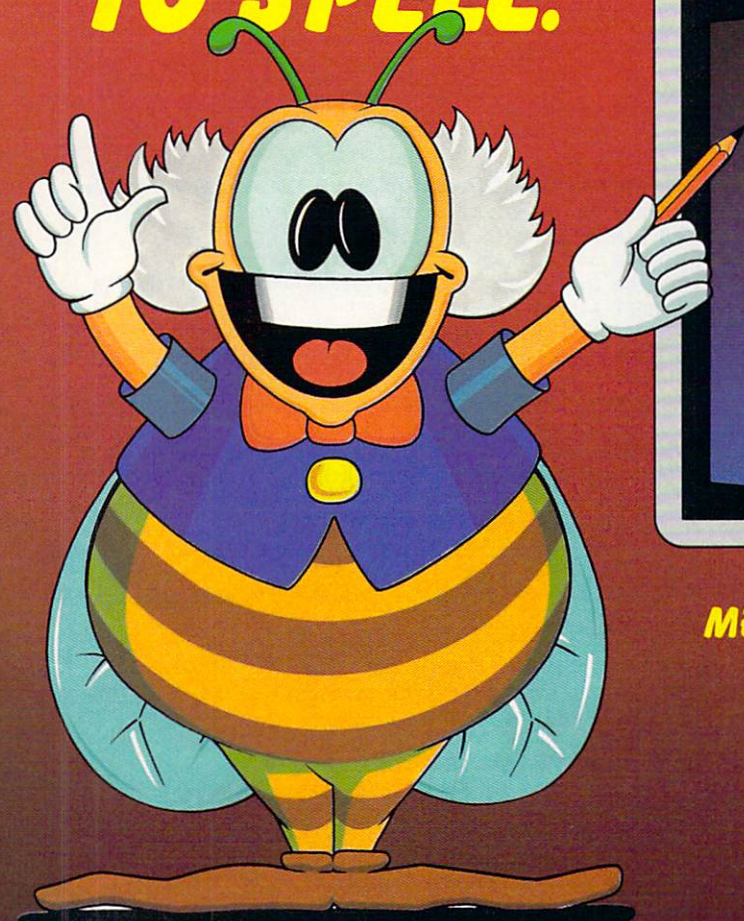
```
20 CLEAR 1000
```

Finally, add a semicolon to the end of lines 140-160, 320, 330, 490, 500, 520, 640, 650, 670, 1050, 1060, 1090, 2010, 2020, 2040, and 3010.

TRS-80 Model 4/Decision Maker

Use the base version, making the same changes as are listed above for Models I and III, with one exception: Add a semicolon to the end of lines 140-160, 320-340, 490-510, 640-660, 1050, 1060, 1090, 2010-2040, and 3010 instead of the lines given for Models I and III.

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PROGRAM BY STEVEN HOROWITZ
PUZZLE BY JOSH GOSFIELD

Sodaville U.S.A. is pretty much like any other small town. People tend to weave in and out of one another's lives. On the surface, the six people in this puzzle seem totally unrelated. But as you delve deeper into their lives, you'll find the complex web of connections. Some of them might have met when they were young and others when they were old. But only one of them has connections with all of the other five.

It's your job to poke and probe until you find out who this person is. To try to get to know the Sodaville group, you may explore their lives by decades (ages 10, 20, 30, 40, and 50) and ask them questions about five areas of their lives. For ages 10 and 20, you can inquire about their hobby, the school they attended, or who their "steady date" was; for ages 30, 40, and 50, you may ask for their hobby, the company they worked for, or the name of their spouse. (Be sure to set your computer for all up-

percase letters.)

The computer will ask you whom you would like to speak to. Type in the person's name exactly as shown in the illustration. The computer will then ask what you would like to know about that person. You may phrase a question any way you wish, but always include one of the five areas and the decade (in digits) in the question. For example: WHAT WAS YOUR HOBBY AT 30? But ask about only one age and one category at any time.

Be nosy. Don't be afraid to ask personal questions! Remember, Sodaville is a small town, and people may have run into one another just about anywhere and under any circumstances, from a quick game at the tennis court to a romance at the office or school. Years later, they may have met and married one (or more) of their sandbox playmates. But for a connection to have been made between any two people, they must have been at the same place at the same time.

When you think you know who "know-'em-all" is, type GUESS and press RETURN or ENTER. You'll have to state at what age your choice crossed paths with each of the other five people. Remember: the web of connections grows more complex as the years march on.

STEVE HOROWITZ, a 16-year-old junior at Staples High School in Westport, Connecticut.

JOSH GOSFIELD wanted to be a baseball player when he was 10; when he was 20 he studied agricultural engineering; at 30 he is a designer at Fortune. When he's 40 he hopes to rule the world.

Base Version (Commodore 64)/Crossing Paths

```
10 REM CROSSING PATHS, BY STEVE HOROWITZ
20 DIM A$(50),P(6,3,5):U$=CHR$(34)
40 FOR A=1 TO 44:READ A$(A):NEXT A
50 FOR Q=1 TO 5:FOR H=1 TO 3:FOR A=1 TO 6:READ P(A,H,Q)
):NEXT A:NEXT H:NEXT Q
60 FOR A=1 TO 7:READ D$(A):NEXT A
70 TK$="WHOM DO YOU WISH TO TALK TO?":TN$="WHOM DO YOU
WISH TO TALK TO NOW?"
80 HP$="I HOPE I'M INTERPRETING YOUR MEANING CORRECTLY
... "
90 PRINT CHR$(147):PRINT TAB(11);":CROSSING PATHS:"
100 PRINT:PRINT "WHAT IS YOUR NAME?":INPUT N$:PRINT CH
R$(147)
110 PRINT:PRINT Z$=TK$:TK$=TN$:GOSUB 1000
120 PRINT:Z$="(TYPE "+U$+"GUESS"+U$+" TO GUESS THE ANS
WER, "+U$+"QUIT"+U$
130 Z$=Z$+" TO STOP THE PROGRAM)":GOSUB 1000:N$="":IN
PUT N$
140 IF N$="GUESS" THEN 670
150 IF N$<>"QUIT" THEN 180
160 PRINT CHR$(147):PRINT:Z$="SORRY, "+N$+": BETTER LU
CK NEXT TIME.":GOSUB 1000
170 GOTO 820
180 GOSUB 3000:IF N=0 THEN 110
190 PRINT CHR$(147):PRINT:Z$="HELLO, "+N$+", THIS IS "
+N$+"":GOSUB 1000
200 Z$="WHAT DO YOU WANT TO KNOW ABOUT ME?":GOSUB 1000
:TY$="":PRINT"=->";
210 GET LR$:IF LR$="" THEN 210
220 IF LR$=CHR$(13) THEN 280
230 TY$=TY$+LR$
240 IF LR$<>CHR$(20) OR LEN(TY$)=0 THEN 270
250 IF LEN(TY$)<3 THEN TY$="":GOTO 270
260 TY$=LEFT$(TY$,LEN(TY$)-2)
270 PRINT LR$;:GOTO 210
280 IF TY$="" THEN PRINT CHR$(147):GOTO 110
290 PRINT:PRINT:PRINT "HMMM...":PRINT
300 DI$="":D=0
310 FOR A=1 TO LEN(TY$):K$=MID$(TY$,A,1)
320 IF K$<"/" OR K$>="/" THEN 340
330 DI$=DI$+K$:IF A>LEN(TY$) THEN 350
340 IF DI$<>" " THEN D=VAL(DI$):DI$=""
350 NEXT A:FD=0:IF LEN(TY$)<6 THEN 400
360 FOR A=1 TO LEN(TY$)-1:FOR B=1 TO 7
370 IF A+LEN(D$(B))-1>LEN(TY$) THEN 390
380 IF MID$(TY$,A,LEN(D$(B)))=D$(B) THEN FD=B
390 NEXT B:NEXT A
400 IF FD<>0 THEN 430
410 PRINT CHR$(147):PRINT:Z$="I'M SORRY, BUT I DON'T U
NDERSTAND YOU."
420 GOSUB 1000:GOSUB 2000:GOTO 110
430 IF D<>0 THEN 460
```


WILMA

FRED

CARLA

SALLY

WALTER

PHILLIP

HELLO!

How Y'DOIN'?

HIYA!

HOWDY

GOOD DAY

WHAT'S UP?

10
YEARS
OLD



I'M STUDYING
HOME EC.

I'M STUDYING
GIRLS

I'M STUDYING
DRAMA

I'M STUDYING
SHORTHAND

I'M STUDYING
BUSINESS

I'M STUDYING
PROGRAMMING

20
YEARS
OLD



I'M A
WAITRESS

I'M AN
ELECTRICIAN

I'M AN
ACTRESS

I'M A
SECRETARY

I'M AN OFFICE
MANAGER

I'M A COMPUTER
PROGRAMMER

30
YEARS
OLD



I'M A
CHEF

I'M AN
ELECTRICIAN

I'M A
MOVIE STAR

I'M A
HOUSEWIFE

I'M A VICE
PRESIDENT

I'VE STARTED
A COMPANY

40
YEARS
OLD



I'M A RESTAU-
RANT OWNER

I'M AN
ELECTRICIAN

I'M IN PUBLIC
RELATIONS

I'M A
HOUSEWIFE

I'M A
PRESIDENT

I'M RUNNING
MY COMPANY

50
YEARS
OLD



PUZZLE

```

440 PRINT:Z$="YOU MUST SPECIFY WHAT AGE YOU ARE TALKIN
G ABOUT."
450 GOSUB 1000:GOSUB 2000:GOTO 110
460 DT=D/10:IF (INT(DT)=DT) AND DT>=1 AND DT <=5 THEN
490
470 Z$="YOU MAY ONLY ASK ABOUT AGES 10, 20, 30, 40, AN
D 50."
480 GOSUB 1000:GOSUB 2000:GOTO 110
490 IF FD<>1 THEN 520
500 Z$="AT AGE "+STR$(D)+" MY "+D$(1)+" WAS "+A$(P(N,1
,DT))+"."
510 GOSUB 1000:GOSUB 2000:GOTO 110
520 IF FD>3 THEN 590
530 WR=0:IF FD=2 AND DT>2 THEN FD=3:Z$=HP$
540 IF FD=3 AND DT<3 THEN FD=2:Z$=HP$
550 Z$=Z$+"AT AGE "+STR$(D)+" "
560 IF P(N,2,DT)<>7 THEN 580
570 Z$=Z$+"I WAS "+A$(7)+" "+D$(FD)+"":GOSUB 1000:GOS
UB 2000:GOTO 110
580 Z$=Z$+"MY "+D$(FD)+" WAS "+A$(P(N,2,DT))+"":GOSUB
1000:GOSUB 2000:GOTO 110
590 IF FD=4 AND DT>2 THEN Z$=HP$:FD=5:GOTO 610
600 IF FD>4 AND DT<3 THEN Z$=HP$:FD=4
610 IF FD=6 AND (N>4 OR N=2) THEN Z$=HP$:FD=7
620 IF FD=7 AND N<5 AND N<2 THEN Z$=HP$:FD=6
630 Z$=Z$+"AT AGE "+STR$(D)+" "
640 IF P(N,3,DT)<>43 THEN 660
650 Z$=Z$+"I WAS "+A$(43)+"":GOSUB 1000:GOSUB 2000:GO
TO 110
660 Z$=Z$+"MY "+D$(FD)+" WAS "+A$(P(N,3,DT))+"":GOSUB
1000:GOSUB 2000:GOTO 110
670 PRINT CHR$(147):PRINT:Z$="WHO DO YOU THINK IT IS?"
:GOSUB 1000:INPUT NA$
680 GOSUB 3000:IF N=0 THEN 110
690 PRINT CHR$(147):PRINT:Z$="AT WHAT AGE WAS "+NA$+"
CONNECTED TO..":GOSUB 1000
700 FL=0:FOR A=37 TO 42
710 IF A=N+36 THEN 740
720 PRINT A$(A):INPUT S
730 IF S<>(ASC(MID$(A$(44),A-36,1))-58)*10 THEN FL=FL+
1
740 NEXT A
750 IF N=6 AND FL=0 THEN 780
760 PRINT CHR$(147):PRINT:PRINT "SORRY, YOU'RE WRONG."
:PRINT
770 GOSUB 2000:GOTO 110
780 PRINT CHR$(147):PRINT
790 POKE 54296,15:POKE 54278,228:POKE 54273,57
800 POKE 54276,33:FOR T=1 TO 200:NEXT T:POKE 54276,0
810 Z$="YOU SOLVED THE PUZZLE!":GOSUB 1000
820 END
1000 IF LEN(Z$)<40 THEN 1060
1010 FOR A=1 TO 39
1020 IF ASC(MID$(Z$,A,1))=32 THEN J=A
1030 NEXT A
1040 PRINT LEFT$(Z$,J-1)
1050 Z$=RIGHT$(Z$,LEN(Z$)-J):GOTO 1000
1060 PRINT Z$:PRINT:Z$="":RETURN
2000 Z$="PRESS ANY KEY TO CONTINUE.":GOSUB 1000
2010 GET AN$:IF AN$="" THEN 2010
2020 PRINT CHR$(147):RETURN
3000 N=0:FOR A=37 TO 42
3010 IF NA$=A$(A) THEN N=A-36
3020 NEXT A
3030 IF N<>0 THEN 3060
3040 PRINT CHR$(147):PRINT:Z$="THERE IS NO ONE HERE BY
THAT NAME."
3050 GOSUB 1000:GOSUB 2000
3060 RETURN
4000 DATA SODAVILLE ELEMENTARY,SPUTZ VOCATIONAL,PIZZA
VILLAGE,LE STUFFE
4010 DATA CHEZ WILMA,FRANKLIN MILITARY,NOT ASSOCIATED
WITH ANY,HOME LIGHTING
4020 DATA DATA-TECH,GOLDEN STUDIOS,EDWARDS ELEMENTARY
4030 DATA SODAVILLE COMMUNITY COLLEGE,ARLES ACADEMY,ES
TON UNIVERSITY
4040 DATA ABC INDUSTRIES,MORRIS POLYTECHNIC,MAKING MUD
PIES,BAKING,BASEBALL

```

```

4050 DATA MAKE-BELIEVE,FILMS,NIGHTLIFE,PLAYING THE STO
CK MARKET,JOGGING
4060 DATA WALKING,KNITTING,TV,RUNNING A LEMONADE STAND
,CLASSICAL MUSIC,WINE
4070 DATA TENNIS,YACHTING,SCIENCE FICTION,CHESS,PHOTOGR
APHY,GOLF
4080 DATA WILMA,FRED,CARLA,SALLY,WALTER,PHILLIP,UNATTA
CHED,;>=?;!
4090 DATA 17,19,20,17,28,33,1,6,11,1,13,1,43,43,41,42
4100 DATA 39,40,18,19,21,24,29,33,2,7,12,12,14,16,38
4110 DATA 37,41,43,39,43,18,19,22,25,31,34,3,8,10,8
4120 DATA 15,15,43,40,43,38,43,43,18,19,22,26,36,35,4
4130 DATA 9,10,7,15,9,43,40,43,38,43,43,18,19,23,27,32
4140 DATA 30,5,10,10,7,15,9,43,40,42,38,43,39
4150 DATA HOBBY,SCHOOL,COMPANY,STEADY DATE,SPOUSE,HUSB
AND,WIFE

```

MODIFICATIONS FOR OTHER COMPUTERS

ADAM/Crossing Paths

Use the base version, with the following alterations:
 Change PRINT CHR\$(147) to HOME in lines 160, 190, 280, 410, 670, 690, 760, 2020, and 3040. Omit lines 30, 220, 790, and 800. Finally, change lines 90, 210, 780, 820, 1000, and 1010 to read as follows:
 90 HOME:INVERSE:HTAB 8:PRINT ":CROSSING PATHS:":NORMAL
 210 GET LR\$:IF LR\$=CHR\$(13) THEN 280
 780 HOME
 820 END
 1000 IF LEN(Z\$) < 31 THEN 1060
 1010 FOR A=1 TO 30

Apple/Crossing Paths

Use the base version, with the following alterations:
 Change PRINT CHR\$(147) to HOME in lines 160, 190, 280, 410, 670, 690, 760, 2020, and 3040. Omit lines 30, 220, 790 and 800. Finally, change lines 90, 210, 780, and 820 to read as follows:
 90 HOME:INVERSE:HTAB 11:PRINT ":CROSSING PATHS:":NORMA
 L:POKE 34,1
 210 GET LR\$:IF LR\$=CHR\$(13) THEN 280
 780 HOME:PRINT:FOR A=1 TO 4:PRINT CHR\$(7):NEXT A
 820 POKE 34,0:END

Atari/Crossing Paths

First type in the following lines:
 20 DIM A\$(493),A(44,2),D\$(46),D(7,2),P(15,6),Z\$(100),H
 P\$(50),T\$(80),TK\$(32),N\$(20),DIS(10),NA\$(20),LR\$(1)
 30 DIM US(1),RD\$(27),TN\$(32),K\$(1),CS\$(16):US=CHR\$(34)
 :OPEN #1,4,0,"K":CS\$=":CROSSING PATHS:"
 40 FOR A=1 TO 44:READ RD\$:A(A,1)=LEN(A\$)+1:A\$(LEN(A\$)+
 1)=RD\$:A(A,2)=LEN(A\$):NEXT A
 50 FOR Q=1 TO 5:FOR H=1 TO 3:FOR A=1 TO 6:READ X:P((Q*
 3)+H-3,A)=X:NEXT A:NEXT H:NEXT Q
 60 FOR A=1 TO 7:READ RD\$:D(A,1)=LEN(D\$)+1:D\$(LEN(D\$)+1
)=RD\$:D(A,2)=LEN(D\$):NEXT A
 90 PRINT CHR\$(125):POSITION 11,0:FOR C=1 TO LEN(CS\$):P
 =ASC(C\$(C,C))+128:PRINT CHR\$(P):NEXT C
 110 PRINT:PRINT:PRINT TK\$:TK\$=TN\$:Z\$="":PRINT
 120 PRINT "(TYPE ";US;"GUESS";US;" TO GUESS THE ANSWER
 ,":PRINT US;"QUIT";US;" TO STOP THE PROGRAM)":INPUT NA
 \$
 150 IF NA\$="QUIT" THEN PRINT CHR\$(125);"SORRY, ";N\$;"
 BETTER LUCK NEXT TIME.":GOTO 820
 190 PRINT CHR\$(125):PRINT:PRINT "HELLO, ";N\$;" THIS IS
 ";NA\$;"."
 200 PRINT:PRINT "WHAT DO YOU WANT TO KNOW ABOUT ME?":T
 Y\$="":PRINT:PRINT "=->";
 210 GET #1,LR:LR\$=CHR\$(LR):IF LR=155 THEN 280
 230 TY\$(LEN(TY\$)+1)=LR\$
 240 IF LR\$<>CHR\$(126) OR LEN(TY\$)=0 THEN 270
 260 TY\$=TY\$(1,LEN(TY\$)-2)
 310 FOR A=1 TO LEN(TY\$):K\$=TY\$(A,A)
 320 IF K\$>"/" AND K\$<":" THEN DIS(LEN(DIS)+1)=K\$:IF A<
 >LEN(TY\$) THEN 350
 370 IF A+LEN(D\$(D(B,1),D(B,2)))-1 > LEN(TY\$) THEN 390


```

380 IF TY$(A,A+D(B,2)-D(B,1))=D$(D(B,1),D(B,2)) THEN F
D=B
410 PRINT CHR$(125):PRINT:PRINT "I'M SORRY, BUT I DON'T
UNDERSTAND YOU.":GOSUB 2000:GOTO 110
430 IF D=0 THEN PRINT:PRINT "YOU MUST SPECIFY WHAT AGE
YOU ARE":PRINT:TALKING ABOUT.":GOSUB 2000:GOTO 110
470 PRINT:PRINT "YOU MAY ONLY ASK ABOUT AGES 10, 20,":
PRINT "30, 40, AND 50.":GOSUB 2000:GOTO 110
500 PRINT "AT AGE ";STR$(D):PRINT " MY ";D$(D(1,1),D(1
,2));" WAS ";A$(A(P(DT*3-2,N),1),A(P(DT*3-2,N),2));".
510 GOSUB 2000:GOTO 110
550 PRINT Z$:"AT AGE ";STR$(D)
560 IF P(DT*3-1,N)=7 THEN PRINT "I WAS ";A$(86,108);"
";D$(D(FD,1),D(FD,2));".":GOSUB 2000:GOTO 110
580 PRINT "MY ";D$(D(FD,1),D(FD,2));" WAS ";A$(A(P(DT*
3-1,N),1),A(P(DT*3-1,N),2));".":GOSUB 2000:GOTO 110
630 PRINT Z$:PRINT "AT AGE ";STR$(D)
640 IF P(DT*3,N)=43 THEN PRINT "I WAS ";A$(478,487);".
":GOSUB 2000:GOTO 110
660 PRINT "MY ";D$(D(FD,1),D(FD,2));" WAS ";A$(A(P(DT*
3,N),1),A(P(DT*3,N),2));".":GOSUB 2000:GOTO 110
670 PRINT CHR$(125):PRINT:PRINT "WHO DO YOU THINK IT I
S";:INPUT NAS:GOSUB 3000:IF N=0 THEN 110
690 PRINT CHR$(125):PRINT:PRINT "AT WHAT AGE WAS ";NAS
;" CONNECTED TO.":PRINT
720 PRINT A$(A(1),A(2));:INPUT S:Q=A(44,1)+A-37:IF
S<>(ASC(A$(Q,Q))-58)*10 THEN FL=FL+1
790 FOR A=1 TO 4:PRINT CHR$(253):NEXT A:PRINT "YOU SOL
VED THE PUZZLE!!"
820 CLOSE #1:END
2000 PRINT:PRINT "PRESS ANY KEY TO CONTINUE.":GET #1,K
:PRINT CHR$(125):RETURN
3010 IF NAS=A$(A(1),A(2)) THEN N=A-36
3030 IF N=0 THEN PRINT CHR$(125):PRINT:PRINT "THERE IS
NO ONE HERE BY THAT NAME.":GOSUB 2000

```

Then add lines 10, 70, 80, 140, 180, 230, 250, 270, 290, 300, 340-360, 390, 400, 460, 490, 520-540, 590-620, 700, 710, 740, 750, 770, 3000, 3020, 3060, and 4000-4150 from the base version. Finally, add lines 100, 280, 760, and 780 from the base version after changing CHR\$(147) to CHR\$(125).

VIC-20 w/16K RAM Cartridge/Crossing Paths

Use the base version, except change lines 90, 790, 800, 1000, and 1010 to read as follows:

```

90 PRINT CHR$(147):PRINT TAB(2);":CROSSING PATHS:"
790 POKE 36876,186:POKE 36878,155
800 FOR T=1 TO 200:NEXT T:POKE 36878,0
1000 IF LEN(Z$)<22 THEN 1060
1010 FOR A=1 TO 21

```

TI-99/4A w/TI Extended BASIC/Crossing Paths

Use the base version, with the following alterations:
First, use a double colon (":") instead of a single colon to separate multiple statements on a single numbered program line. So, for example, you would change line 20 to read:

```
20 DIM A$(50),P(6,3,5) :: U$=CHR$(34)
```

Second, change PRINT CHR\$(147) to CALL CLEAR in lines 90, 100, 160, 190, 280, 410, 670, 690, 760, 780, 2020, and 3040. Third, change MID\$ to SEG\$ in lines 380, 730, and 1020. Fourth, omit lines 220-270 and 790. Fifth, in lines 120, 130, 160, 190, 500, 550, 570, 580, 630, 650, and 660, change all plus signs (+) to ampersands (&). Finally, change lines 200, 210, 790, 1040, 1050, and 2010 to read as follows:

```

200 Z$="WHAT DO YOU WANT TO KNOW ABOUT ME?" :: GOSUB
1000 :: PRINT "(NO COMMAS, PLEASE)" :: PRINT :: TY$=""
:: PRINT "=->";
210 INPUT TY$
790 FOR A=1 TO 4 :: CALL SOUND(500,220,0) :: NEXT A
1040 PRINT SEG$(Z$,1,J-1)
1050 Z$=SEG$(Z$,J+1,LEN(Z$)-J) :: GOTO 1000
2010 CALL KEY(5,AN,ST) :: IF ST=0 THEN 2010

```

TRS-80 Color Computer/Crossing Paths

Use the base version, with the following alterations:
Change PRINT CHR\$(147) to CLS in lines 100, 160, 190, 280, 410, 670, 690, 760, 780, 2020, and 3040. Omit line 800. Finally, change lines 20, 90, 210, 240, 790, 1000, 1010, and 2010 to read as follows:

```

20 CLEAR 2000:DIM A$(50),P(6,3,5):U$=CHR$(34)
90 CLS:PRINT TAB(7);":CROSSING PATHS:"
210 LR$=INKEY$:IF LR$="" THEN 210
240 IF LR$<>CHR$(8) OR LEN(TY$)=0 THEN 270
790 FOR A=1 TO 4:SOUND 100,5:NEXT A
1000 IF LEN(Z$)<32 THEN 1060
1010 FOR A=1 TO 31
2010 AN$=INKEY$:IF AN$="" THEN 2010

```

TRS-80 Model III/Crossing Paths

Use the base version, with the following alterations:
Change PRINT CHR\$(147) to CLS in lines 100, 160, 190, 280, 410, 670, 690, 760, 780, 2020, and 3040. Omit lines 790 and 800. Finally, change lines 20, 90, 210, 240, 1000, 1010, and 2010 to read as follows:

```

20 CLEAR 2000:DIM A$(50),P(6,3,5):U$=CHR$(34)
90 CLS:PRINT TAB(25);":CROSSING PATHS:"
210 LR$=INKEY$:IF LR$="" THEN 210
240 IF LR$<>CHR$(8) OR LEN(TY$)=0 THEN 270
1000 IF LEN(C$)<64 THEN 1060
1010 FOR A=1 TO 63
2010 AN$=INKEY$:IF AN$="" THEN 2010

```

TRS-80 Model IV/Crossing Paths

Make the same changes that are listed above for the Model III, but change 25 to 35 in line 90, 64 to 80 in line 1000, and 63 to 79 in line 1010.

IBM PC/Crossing Paths

Use the base version, with the following alterations:
Change PRINT CHR\$(147) to CLS in lines 100, 160, 190, 280, 410, 670, 690, 760, 780, 2020, and 3040. Omit line 800. Finally, change lines 90, 210, 240, 270, 790, 1000, 1010, and 2010 to read as follows:

```

90 CLS:PRINT TAB(35);":CROSSING PATHS:"
210 LR$=INKEY$:IF LR$="" THEN 210
240 IF LR$<>CHR$(8) OR LEN(TY$)=0 THEN 270
270 IF LR$=CHR$(8) THEN PRINT CHR$(29);" ";CHR$(29);:GO
TO 190 ELSE PRINT LR$;:GOTO 190
790 FOR A=1 TO 4:BEEP:NEXT A
1000 IF LEN(C$)<80 THEN 1060
1010 FOR A=1 TO 79
2010 AN$=INKEY$:IF AN$="" THEN 2010

```

ATTENTION PUZZLE FANS!

Do you have an original idea for FAMILY COMPUTING's monthly puzzle? We will pay \$150 for every fully developed puzzle program we publish. Send a complete explanation of your puzzle along with a disk or tape containing two copies of your program (try not to exceed 100 lines) and a listing (preferably a printout) to Puzzle, FAMILY COMPUTING, 730 Broadway, New York, NY 10003. Include your name, age, address, day and night phone numbers, computer model, and the level of BASIC and memory required. If you want your disk or tape returned, enclose a stamped, self-addressed mailer. FAMILY COMPUTING cannot assume responsibility for the loss of or damage to any unsolicited materials.

TUNE UP YOUR TYPING

BY SARAH KORTUM

The last thing Kim Thornton was interested in back in high school was typing class. The year was 1968, and the Beatles hit "Hey Jude" ruled the airwaves.

Kim and his friends would gather in the lot in back of the restaurant Kim's parents owned, and work on cars late into the night. They'd rig up a couple of lights outside and turn up the radio. Evansville, Indiana, gets hot in the summer, and they'd be surrounded by fireflies as they worked.

Their goal was always the same, to see "who could build the fastest car," explains Kim. He had a '55 Chevy that was white on the top and black on the bottom. "I never much went for [fixing up] the body, just for how much of a hot rod it was!"

One of Kim's friends owned a '59 Corvette, and the two would often test their finished products up and down Harlan Avenue. But "we never did find out who had the fastest car!" says Kim. It was always a tie.

A few years later, one of Kim's friends set him up on a blind date with a North High senior named Cheryl. Kim had already graduated from North and was in the Army, heading for Vietnam. Cheryl wore a lavender shorts outfit. It was a double date. They went bowling. Two years later, in 1973, they were married.

TEN YEARS LATER

Now, 10 years later, Kim and Cheryl and their two kids have settled in a house eight miles from the old high school. Kim has converted half of the garage into workshop and office space for the heating

and air-conditioning business that he started five years ago.

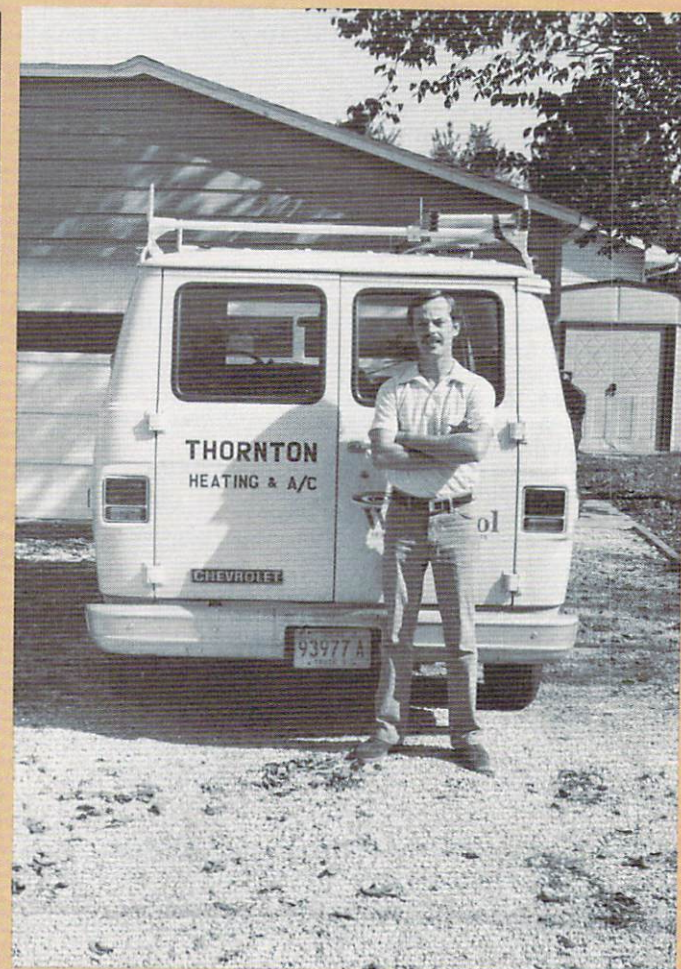
On a shelf in the office is a copy of the old typing book that was used at North High. The typing book's pages have yellowed with time, but you can still make out the office scene on the cover, with pictures of people sitting in front of typewriters.

Not that Kim sees the cover much. Most of the important letters and advertising fliers for the business are typed by Cheryl, who managed to brave typing class at North High. Kim still struggles along with the old hunt-and-peck method. "I still can't type without looking at the keys! The bottom row really bothers me!"

But now that he's owned a computer for three years, Kim realizes the advantages of being quick and accurate at the keyboard, particularly since he writes programs to help him with his business. One program he wrote keeps track of the income and expenses of his business. Another uses charts from the National Weather Service to help him monitor temperature and fuel consumption.

So last year, on a sweltering summer evening just like those evenings in 1968 when he used to work outside on his '55 Chevy, Kim settled down in front of his TRS-80 Model III computer and started using a commercial typing-practice program. "Getting bored with that," and anxious, as always, to avoid typing, he got right to work on a feature that he felt the software lacked: a typing test.

He finished several evenings later and called Cheryl into his office to test it out. Her score was 50-60 words per minute, and she proclaimed it a



Kim Thornton, in front of the company van that has long since replaced his '55 Chevy.

vast improvement over the old way, when the North High typing teacher would stand behind her, stopwatch in hand, making her nervous. Kim's score was a paltry 20 words per minute, and has remained so because, as he admits quite frankly, "I'd rather program than learn how to type!"

HOW TO USE TYPE TEST

Kim recommends his program for students and programmers trying to improve their typing, or for people who are looking for employment where typing is involved.

Directions appear on the screen when the program is run. To use *Type Test*,

just pick out any text, press ENTER to begin, and start typing. It isn't necessary to type for a full minute, as the computer calculates the average time between keystrokes and counts five keystrokes as one word. But about three lines of text are needed to obtain a good average. Immediately after you have finished typing in the text, press the CLEAR key, and the computer will display your typing speed in words per minute. It will then give you the option of counting your errors so that the computer can determine your net typing speed as well (that is, how many error-free words you can type per minute).

SARAH KORTUM is *lifestyles* editor of FAMILY COMPUTING.

TRS-80 Model III/Type Test

```

10 '*** TYPING SPEED TEST BY KIM G. THORNTON ***
20 ON ERROR GOTO 450 '*** PREVENTS DIVISION BY ZERO
   ERROR ***
30 '***** INSTRUCTIONS *****
40 CLS:PRINT TAB(19);"*** TYPING SPEED TEST ***"
50 PRINT:PRINT:PRINT TAB(8);"USING ANY TEXT OF YOUR CH
   OICE, TYPE IN AT LEAST"
60 PRINT TAB(8);"THREE LINES TO OBTAIN AN AVERAGE OF Y
   OUR SPEED."
70 PRINT TAB(8);"WHEN YOU HAVE COMPLETED THE TEXT, PRE
   SS THE"
80 PRINT TAB(8);"<CLEAR> KEY TO DISPLAY YOUR TYPING SP
   EED IN"
90 PRINT TAB(8);"WORDS PER MINUTE."
100 PRINT:PRINT:PRINT "PRESS ANY KEY TO CONTINUE ..."
110 GOSUB 1000
120 '***** MAIN PROGRAM *****
130 CLS:PRINT CHR$(15);"GET READY TO TYPE YOUR TEXT."
140 PRINT "TO START THE TEST, PRESS <ENTER>."
150 GOSUB 1000
160 IF ASC(Q$)=13 THEN 170 ELSE 150
170 CLS
180 POKE 16409,0 '*** SWITCH TO LOWERCASE LETTERS **
   *
190 POKE 16920,0:POKE 16919,0 '*** ZEROS CLOCK ***
200 PRINT CHR$(14) '*** TURN CURSOR ON ***
210 A$=INKEY$:IF A$="" THEN 210 ELSE PRINT A$;
220 S=S+1 '*** NUMBER OF KEYSTROKES ***
230 IF ASC(A$)=31 THEN 250 '*** CHECK FOR CLEAR KEY
   ***
240 GOTO 210
250 W=S/5 '*** NUMBER OF WORDS ***
260 TM=PEEK(16920)*60+PEEK(16919) '*** CHECK TIME **
   *
270 WMX=60*(W/TM) '*** WORDS PER MINUTE ***
280 PRINT:PRINT:PRINT"*** YOU HAVE BEEN TYPING AT THE
   RATE OF";WMX;"WORDS PER MINUTE ***"
290 PRINT:PRINT "DO YOU WANT TO COMPUTE YOUR NET SPEED
   ? (Y OR N)";
300 GOSUB 1000
310 IF Q$="Y" OR Q$="y" THEN 340
320 IF Q$="N" OR Q$="n" THEN 380
330 GOTO 300
340 PRINT:INPUT "HOW MANY OF THE WORDS YOU TYPED CONTA
   INED AT LEAST ONE ERROR";WR
350 IF WR<0 THEN 340
360 NSX = 60*(W-WR)/TM
370 PRINT:PRINT"*** YOUR NET SPEED WAS";NSX;"WOR
   DS PER MINUTE ***"
380 PRINT:PRINT "DO YOU WANT TO TRY AGAIN? (Y OR N)";
390 GOSUB 1000
400 IF Q$="Y" OR Q$="y" THEN 130
410 IF Q$="N" OR Q$="n" THEN 430
420 GOTO 390
430 POKE 16409,1 '*** RETURN TO UPPERCASE LETTERS **
   *
440 END
450 RESUME 210
1000 Q$=INKEY$:IF Q$="" THEN 1000
1010 RETURN

```

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FAMILY COMPUTING wants to publish your best original computer programs. We prefer programs under 100 lines, especially games or those that have useful applications in the home. Send a disk or tape containing two copies of your program plus a listing (preferably a printout) to The Programmer, FAMILY COMPUTING, 730 Broadway, New York, NY 10003. Include your name, age, address, day and night phone numbers, computer model, program titles with brief descriptions, and the level of BASIC and memory required. We will pay \$50 for those we publish. If you want your disk or tape returned, enclose a stamped, self-addressed mailer. FAMILY COMPUTING cannot assume responsibility for the loss of or damage to any unsolicited materials.

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WHAT'S IN STORE

NEW HARDWARE ANNOUNCEMENTS*

WORKSLATE PORTABLE; GE DATA RECORDER;
HAND-HELD MICROWRITER; ALIEN'S SPRINTER BUFFER

COMPUTERS



Microwriter

MANUFACTURER: Microwriter Inc., 17 E. 71st St., New York, NY 10021; (212) 288-8863
PRICE: \$499

Microwriter, a British product invented by an American, is a "method of getting thoughts onto paper without using a typewriter," according to the company. Instead of typing or writing, the user forms the shapes of letters with the fingertips of one hand. "Microwriting" in this fashion on the five-finger keyboard is up to 150-percent faster than handwriting, according to its boosters.

The paperback-book-size keyboard has an 8K memory, enough to store about five double-spaced pages; some text editing features are built-in. Text can be saved on microcassettes, or sent to a printer via an RS 232 serial port.

TRS-80 Model 4P

MANUFACTURER: Tandy Corp./Radio Shack, 1800 Tandy Center, Ft. Worth, TX 76102; (817) 390-3011
PRICE: \$1,799

**These products have been announced by manufacturers, but are not necessarily in the stores yet. Some products may still be under development, and others may be in test markets only. Call or write the manufacturer for expected date of delivery.*

Radio Shack has introduced a trans-portable, compact version of its Model 4 computer. The Model 4P can be used anywhere there's an AC outlet, and is small enough to be stowed on overhead luggage racks on planes, trains, or buses. It weighs 26 pounds, and has a built-in carrying handle.

Model 4P is compatible with all Model 4 programs and most Model III programs, and with Radio Shack's CPM Plus operating system, which supports hundreds of business programs. Its 64K memory can be expanded to 128K; and the 4P can be bought with two built-in 184K double-density disk drives. The 9-inch screen displays 24 lines of 80 characters each. A direct-connect modem circuit board (\$150) can be installed by the user.

WorkSlate

MANUFACTURER: Convergent Technologies, 2441 Mission College Blvd., Santa Clara, CA 95050; (408) 727-8830
PRICE: \$895



The briefcase-size portable sector of the computer market is heating up. The WorkSlate portable, with 16K RAM and 64K ROM, can be a dictating machine, a calendar, an alarm clock, an address book, an auto-dialer, a speaker phone, a calculator, a notepad, and an "electronic work-slate." The built-in worksheet software allows you to do spreadsheet analysis, tax planning, and budgeting, and to keep track of expense accounts.

WorkSlate's liquid-crystal screen display is 46 characters by 16 lines,

or about twice as large as other portable computer screen's display. It has a built-in modem, built-in microcassette recorder, and 60 keys. But because the computer has no built-in word processing, as does the TRS-80 Model 100, the WorkSlate's keys are not intended for writing, but for number crunching.

WorkSlate is obviously a tool for executives, especially those who work with figures. The investment firm Smith Barney Harris Upham & Co. thinks it's quite a good tool: "The level of sophistication of the software, and the integration of the software and hardware in WorkSlate goes well beyond anything else on the market today. It could well make other industry participants rethink their products and approach to this market."

Smith Barney's investment report (they rated Convergent's stock a "buy"), however, was based on viewing a prototype, since WorkSlate was not in production as of this writing. And as several computer manufacturers have found, fulfilling early promise is a tough task. But this one should be fun to watch.

MONITORS

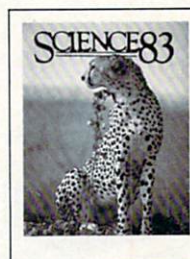
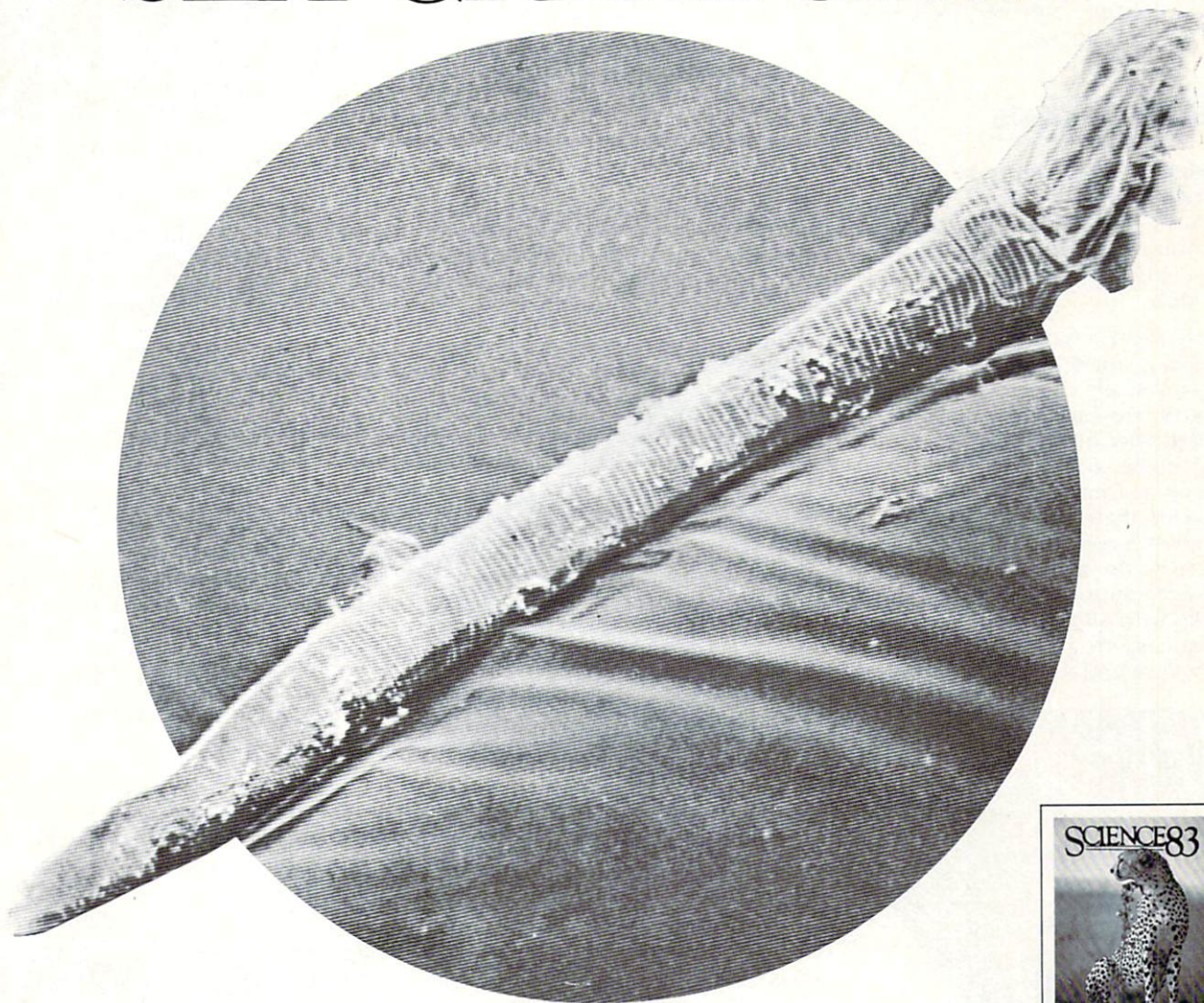
SG-1000 Monitor

MANUFACTURER: Sakata USA, 651 Bonnie Ln., Elk Grove Village, IL 60007; (800) 323-6647; In Illinois: (312) 593-3211
PRICE: \$129

The SG-1000 is a low-priced monochrome monitor, with a green phos-



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SCIENCE 83

WHAT'S IN STORE NEW HARDWARE

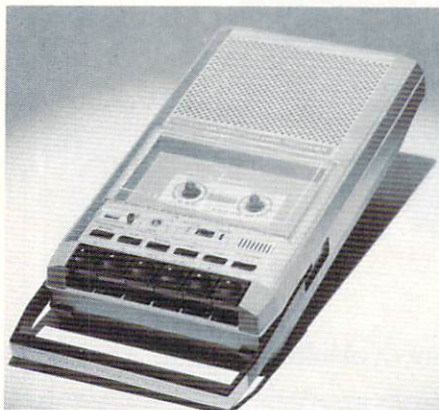
phor screen display. The screen measures 12 inches diagonally. The monitor, with the appropriate cable, works with the following computers: Apple IIs and III, Atari 800, Commodore 64, IBM PC, NEC PC, Osborne, TI-99/4A, and VIC-20.

MISCELLANEOUS

Computer Program Data Recorder

MANUFACTURER: General Electric, Electronics Park, Syracuse, NY 13221; (315) 456-2446
PRICE: \$53

General Electric has identified what it sees as a "niche" in the marketplace—a reliable cassette recorder for computer use—and says its new Data Recorder fills that hole. Although some computer manufacturers, such as Commodore and Atari, have made their own machine-specific cassette recorders, GE is believed to be the first with a general-purpose computer cassette recorder. It works with all computers that support cassette recorders, except Commodore and Atari.



The Data Recorder looks and works, for all intents and purposes, just like a regular cassette recorder. (It can be used for conventional audio recording as well.) However, GE says that it has been designed to prevent the loss of data, which often occurs when a conventional recorder is used as a storage device.

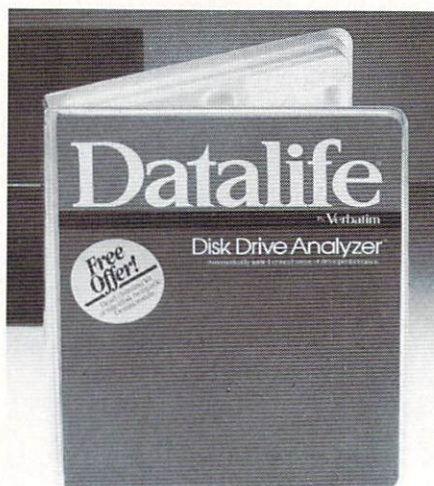
Datalife Disk Drive Analyzer

MANUFACTURER: Verbatim Corp., 323 Soquel Way, Sunnyvale, CA 94086; (800) 538-1793
PRICE: \$39.95

Just like car wheels, disk drive heads fall out of alignment. Or the

drive's rotational mechanism speeds up or slows down. You can test for these mechanical problems yourself with a disk drive analyzer, such as the one from Verbatim, a company best known in the computer field for its floppy disks.

In a matter of minutes, the Datalife Analyzer analyzes four areas of disk drive performance: alignment, crucial to reading data from and writing to disks; disk speed, the fixed number of rotations per minute; disk clamping, the mechanism that holds the disk in place; and read/write heads, which save or ob-



tain data from a disk. The Datalife Analyzer works with Apple II plus, IIe, III, and compatibles.

Such an analyzer is probably best used as preventive medicine, to find problems before they get worse and ruin your disks. However, once you detect a problem, unless you are mechanically inclined, you'll probably have to take the disk drive to a certified repair shop.

Sprinter

MANUFACTURER: The Alien Group, 27 W. 23rd St., New York, NY 10010; (212) 741-1770
PRICE: \$550

Print buffers, which store data and send it to a printer, free up the computer's memory, allowing you to use your computer for other tasks during printing. The Sprinter buffer goes one step further—its stored data can be viewed on a monitor during the printing process.

If, for instance, you have stored a file in the Sprinter's 62K memory space and have started playing a game while the file prints, you can at any time call that file onto the



screen to review it before it's all printed out. For programmers or writers, or anyone who constantly revises files and waits for a new "hard copy," this is a useful feature.

The Sprinter is made of heavy-gauge steel, on which a monitor can be safely placed. Its 12-button keypad features bidirectional scrolling, which allows you to see any portion of your file. The Sprinter comes in both a parallel and a serial version, so that it will work with most types of computer.

Staticide Wipes

MANUFACTURER: ACL Inc., 1960 E. Devon Dr., Elk Grove, IL 60007; (312) 981-9212
PRICE: \$5 per box (24 wipes)



These disposable towelettes slow down dust buildup and static buildup, both of which can foul up a computer's circuitry. ACL says they provide static protection at relative humidities below 15 percent—which is most likely to occur during very cold and dry winter days when static buildup is worst. Write the company for free samples.

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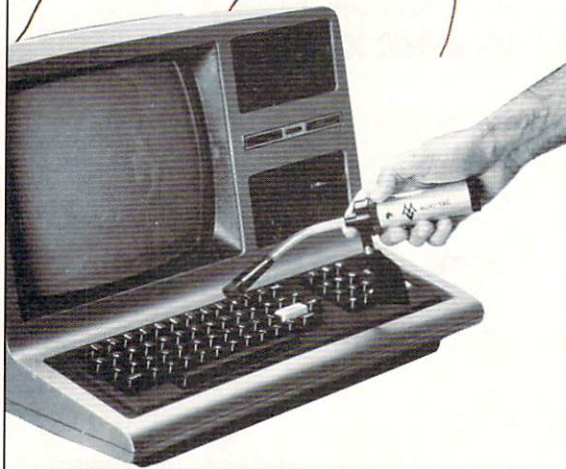
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WHAT'S IN STORE



THE IMMACULATE MICRO

Goodies that crumble are a no-no near the computer. But in the event that your computer comes down with a case of the crumbles, you'll find the Mini-vac invaluable. A micro-cleaning device for your micro-computer, which fits into the palm of your hand and operates on a nine-volt battery or AC adaptor (not included), the tiny vacuum cleaner will also help you keep your monitor screen free of dust buildup. It's available from the Shelburne Company, for \$29.95 plus postage and handling, 110 Painters Mill Rd., Owings Mills, MD 21117; (301) 363-4304.



ALTERNATIVE MEANS OF TRANSPORTATION

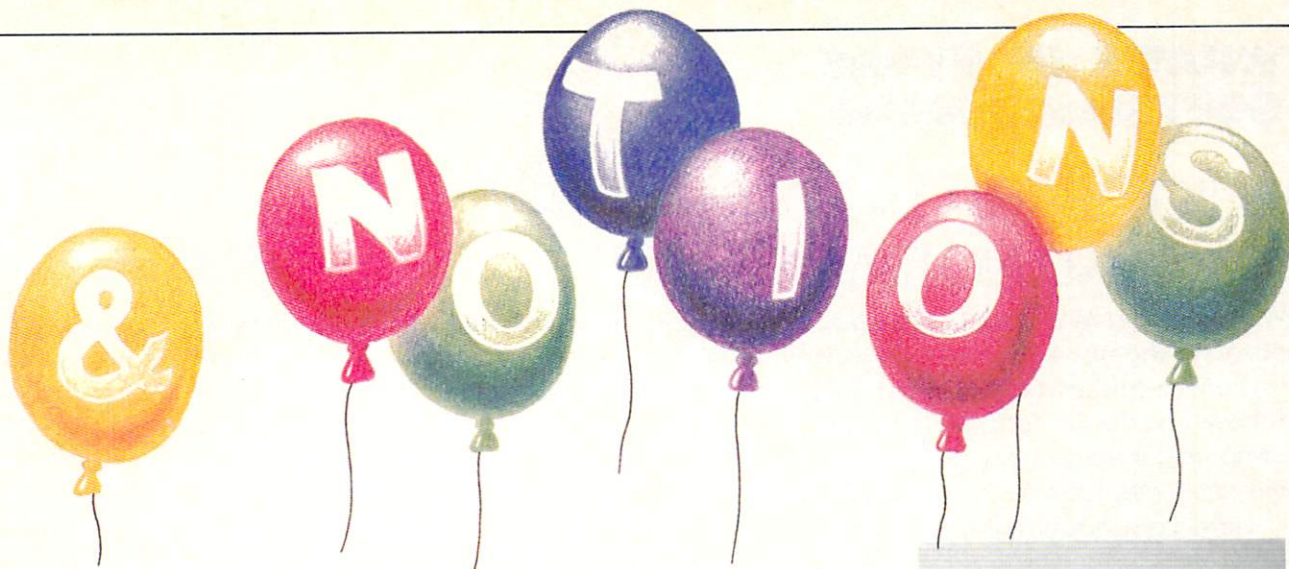
Transporting the treasure has always been something of a hair-raising process. These Microcases protect your prized micro-posessions and provide an unusual dash of color in the process. Foam lining with web straps set into a plastic case make for a lightweight, waterproof means of transportation for your Ap-

ple, Atari, Commodore, or IBM personal computers. Cases to carry monitors and printers are also available. Prices range from \$99 for printer and monitor cases to \$189 for IBM PC cases, at select computer stores or through the manufacturer: The Casemaker, 1754-C Junction Ave., San Jose, CA 95112; (800) 428-7825.



CHIPS THAT MELT IN YOUR MOUTH

Computers have proved to be almost as addictive as chocolate. So it's only fitting that the crucial computer component be immortalized in a bar of solid milk chocolate, appropriately titled Circuit Chips. The seven-ounce sweet edible replica of an integrated circuit board is available for \$4.95 at major department stores, computer and gift shops, or through the manufacturer: Byteware, P.O. Box 6725, Lawrenceville, NJ 08648; (609) 882-5769.



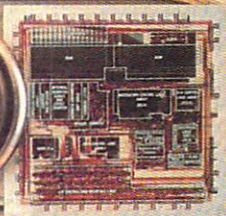
NO-RISK DISK STORAGE

A crimped disk will cramp your style. So carry, store, or file them away in this compact, protective pouch with antistatic vinyl files, sure to prevent against the trauma of floppy-disk casualties. The Diskaddy is available at many computer and stationery stores or through the manufacturer in red, brown, or blue, for \$7.99 to \$14.99, depending on the number of disks you want to store. Contact MB International, 701 B St., Suite 1300, San Diego, CA 92101; (619) 232-8772.



1984 Computer Desk Diary

Including Quick Reference Guides to VisiCalc, CP/M, WordStar, and an ASCII Code Table. Gil Roeder and Jason A. Shulman



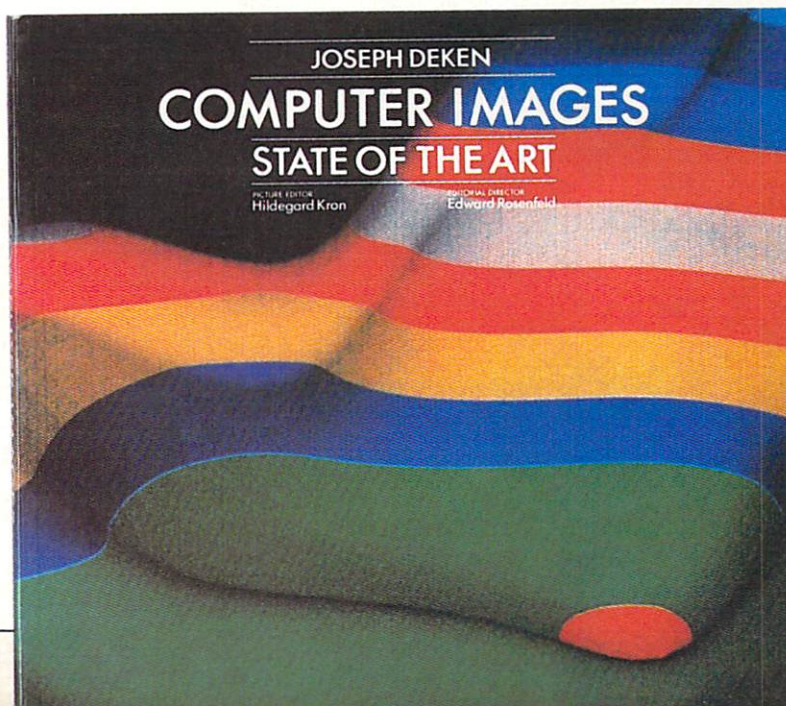
STAYING UP-TO-DATE

Keep track of the new year's dates while keeping up-to-date on the marvels of modern technology with the 1984 Computer Desk Diary. This week-by-week planner features over 50 black-and-white and color illustrations accompanied by concise, often witty accounts of crucial moments and memorabilia from the computer's past. Authors Gil Roeder and Jason A. Shulman have also included easy reference guides to VisiCalc, WordStar, and CP/M operating systems, as well as important dates in the computer's history. Published by Workman Publishing, the 1984 Computer Desk Diary is available for \$8.95 at many bookstores and computer stores.

STATE OF THE ART ART

Computer graphics, like computers, are everywhere. Joseph Deken's fascinating, lushly illustrated book portrays the many dimensions of this newest of visual art forms. With its profuse four-color plates, and clear, straightforward text, *Computer Images: State of the Art* shows how the computer is transforming the world

of communications, engineering, the arts, and the sciences. Computer-literate and illiterate artists, artistic and unartistic computer whizzes alike will delight in this stunning work published by Stewart, Tabori, and Chang, and available at many fine book stores for \$16.95 (softcover), or \$25 (hardcover).



WHAT'S IN STORE SOFTWARE GUIDE

QUICK TAKES ON SOFTWARE— NEW AND NOTEWORTHY

Welcome to FAMILY COMPUTING's Software Guide, the most comprehensive listing available of two dozen of the newest, most noteworthy, and/or best programs on the market. Our reviewers include families from all over the country who have judged the software according to the following criteria: long-term benefits and applications, adaptability, and advantages of using a computer for a given task. Programs have been evaluated and rated for their performance in each of the categories listed below. More detailed reviews follow the chart.

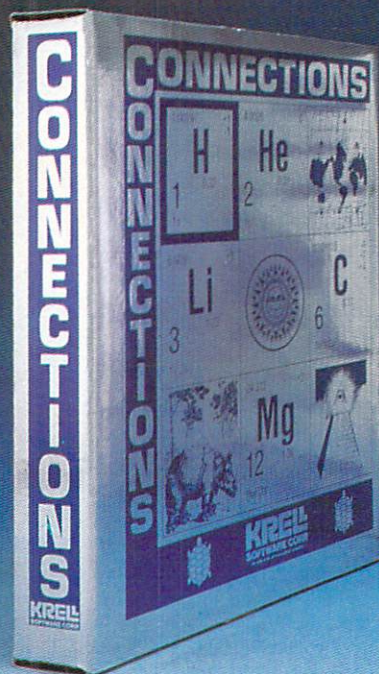
Here's a rundown of the ratings categories and what they mean: **O** = Overall performance, and refers to the software's performance given the limitations and capacities of the particular computer for which it is intended; **D** = Documentation, or the instructions and literature that accompany a program; **EH** = Error-handling, the software's capacity to accommodate errors made by the user—an especially important consideration with software for younger users; **GQ** = Graphics quality, also evaluated in light of each particular brand's graphics capabilities; **EU** = Ease of use after the initial learning period, which varies from computer to computer; **V** = Value for money, or how the software measures up to its price.

HOME BUSINESS AND HOME MANAGEMENT

Title Manufacturer Price	Brief Description	Hardware/ Equipment Required	Backup Policy	Ratings					
				O	D	EH	GQ	EU	V
ATARIWRITER Atari, Inc. 1312 Crossman Ave. P.O. Box 61657 Sunnyvale, CA 94088 (800) 538-8543 \$99.95 ©1983	Easy-to-use word processor with explicit documentation allows for two-column printing and underlining (with appropriate type of printer), and restoration of deleted text, among other features.	Atari 400/800/1200, 16K (cartridge); cassette or disk drive required for storage of long texts.	Defective cartridges replaced free w/ in 90 days; backup copies available for \$30.	★ ★ ★	★ ★ ★	★ ★ ★	n/a	E	★ ★ ★
BANK STREET WRITER Broderbund Software 17 Paul Dr. San Rafael, CA 94903 (415) 479-1170 \$69.95 ©1982	Basic, no-frills word processor perfect for kids and adults just starting out, includes tutorial and explicit menu instructions for writing, editing, saving, and printing papers and correspondence.†	Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800/1200, 48K (disk); tutorial requires BASIC cartridge on the Atari.	Defective disks replaced free; \$5 fee if user-damaged; backup copy included.	★ ★ ★	★ ★ ★	★ ★ ★	n/a	E	★ ★ ★
THE GENERAL MANAGER Sierra On-Line Sierra On-Line Bldg. Coarsegold, CA 93614 (209) 683-6858 \$229.95 ©1982	Thorough data-base management program allows user to create sub-files, print out, and browse easily and quickly through stored information. Numerous, powerful features may be overkill for average home needs.	Apple II/II plus/IIe, 48K (disk).	Defective disks replaced free w/ in 90 days; \$5 fee thereafter; user makes backup copy.	★ ★ ★	★ ★ ★	★ ★ ★	n/a	D	★ ★ ★
MINI JINI RECORD KEEPER Jini Micro-Systems Box 274 Kingsbridge St. Riverdale, NY 10463 (212) 796-6200 \$89.95 ©1983	Electronic index card file stores and retrieves all kinds of information, from mailing lists to health records, and home inventory, is versatile and unusually easy for novices to pick up.†	Commodore 64 (cartridge); also available for VIC-20 (cartridge); requires datasette or disk drive for storage.	Defective cartridge replaced free w/ in 90 days; \$20 fee thereafter.	★ ★ ★	★ ★ ★	★ ★ ★	n/a	E	★ ★ ★
PFS: FILE Software Publishing Corp. 1901 Landings Dr. Mountain View, CA 94043 (415) 962-8910 \$125 ©1982	Flexible data-base management program permits easy storing, filing, and searching through information and texts of limited length, on the basis of almost any number of categories you create. Requires PFS: Report in order to print out.	Apple II/II plus/IIe, 48K (disk).	Defective disks replaced free w/ in 90 days; backup disk included.	★ ★ ★	★ ★ ★	★ ★ ★	n/a	D	★ ★ ★

RATINGS KEY **O** Overall performance; **D** Documentation; **EH** Error handling; **GQ** Graphics quality; **EU** Ease of use; **V** Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★★ Excellent; n/a Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

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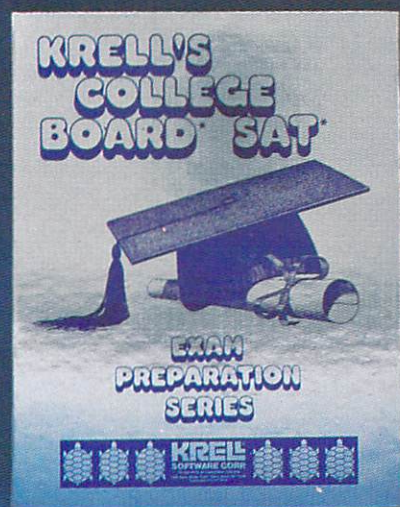
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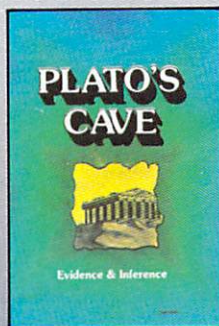
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SOFTWARE GUIDE

EDUCATION/FUN-LEARNING

Title Manufacturer Price	Brief Description	Hardware/ Equipment Required	Backup Policy	Ratings					
				O	D	EH	GQ	EU	V
ALPHABET ZOO Spinnaker 215 1st St. Cambridge, MA 02142 (617) 868-4700 cartridge \$34.95 disk \$29.95 ©1983	Kids learn letter-recognition and spelling skills in maze games with cheery music, and spritely imps. Three-five-year olds may find joystick hard to handle but 6+ crowd who need spelling practice will enjoy.	Atari 400/800/1200, 48K (disk); also available for Apple II plus/IIe, 48K (disk); Commodore 64 (disk or cartridge); joystick required for Atari and Commodore.	Defective material replaced free w/ in 30 days; \$5 fee thereafter; backup copies available for \$12.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A ★ ★	★ ★ ★
BOP-A-BET Sierra On-Line Sierra On-Line Bldg. Coarsegold, CA 93614 (209) 683-6858 \$29.95 ©1983	Alphabet practice maze game for 5-8 year olds flawed by unimpressive graphics, unclear directions, and difficult play system.	Apple II/II plus/IIe, 48K (disk); joystick optional.	Defective disks replaced free w/ in 90 days; \$5 fee thereafter; owner makes backup copies.	★	★	★ ★	★ ★	E ★	★
CRYPTO CUBE DesignWare 185 Berry St., Bldg. 3, Suite 158 San Francisco, CA 94107 (800) 572-7767 \$39.95 ©1983	Eight-year-olds to adults can improve their vocabulary with series of word puzzles hidden in cube. Use programmed words or create your own in games most fun when played by more than one.	Apple II/II plus/IIe, 48K (disk); also available for IBM PC, (disk); Atari 400/800/1200, 48K (disk); IBM requires color card.	Defective disks replaced free; backup copy available for \$12.	★ ★	★ ★	★ ★	★ ★	A ★	★ ★
GERTRUDE'S SECRETS The Learning Company 545 Middlefield Rd. Suite 170 Menlo Park, CA 94025 (415) 328-5410 \$44.95 ©1982	Younger kids, 4-9 are guided by Gertrude, the goose, through a series of rooms solving puzzles, and learning logical problem-solving and shape and pattern recognition en route.	Apple II/II plus/IIe, 48K (disk); joystick optional.	Defective disks replaced free w/ in 90 days; \$12 fee thereafter.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A ★ ★	★ ★ ★
KIDS ON KEYS Spinnaker Software Corp. 215 1st St. Cambridge, MA 02142 (617) 868-4700 cartridge \$34.95 disk \$29.95 ©1983	Four-nine-year-olds will learn fundamental keyboard usage, word and letter recognition in three challenging activities featuring clever graphics.	Commodore 64 (cartridge); also available for Atari 400/800/1200, 48K (disk), 8K (cartridge).	Defective material replaced free w/ in 30 days; \$5 fee thereafter; backup copies available for \$12.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	E ★ ★	★ ★ ★
LEARNING WITH LEEPER Sierra On-Line Sierra On-Line Bldg. Coarsegold, CA 93614 (209) 683-6858 cartridge \$34.95 disk \$29.95 ©1983	Assorted activities with lively, colorful graphics give 3-6-year-olds practice in early numbers, shape recognition, and hand-eye coordination.†	Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800/1200, 16K (cartridge); Commodore 64 (cartridge); joystick required.	Defective material replaced free w/ in 90 days; \$5 fee thereafter; owner makes backup copy.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	E ★ ★	★ ★ ★
MICKEY IN THE GREAT OUTDOORS Walt Disney Productions, distributed by Atari 1312 Crossman Ave. P.O. Box 61657 Sunnyvale, CA 94088 (800) 538-8543 \$44.95 ©1983	Seven-10-year-olds drill and practice math and reading skills in arcade games featuring varying skill-levels and the Disney celebrity, Mickey Mouse.†	Atari 400/800/1200, 32K (disk or cassette), 16K (cartridge); joystick required.	Defective material replaced free w/ in 90 days; backup copies available for \$30.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	E ★ ★	★ ★ ★
ROCKY'S BOOTS The Learning Company 545 Middlefield Rd. Suite 170 Menlo Park, CA 94025 (415) 328-5410 \$49.95 ©1983	Kids 7 and up introduced to electronic circuitry in activities and puzzles which build logic skills, preferable for children over 10.†	Apple II/II plus/IIe, 48K (disk); joystick optional; color TV or monitor recommended.	Defective disks replaced free w/ in 90 days; \$10 fee if user-damaged.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	E ★ ★	★ ★ ★
SPELLICOPTER DesignWare 185 Berry St., Bldg. 3, Suite 158 San Francisco, CA 94107 (800) 572-7767 \$39.95 ©1983	Ages 6-adult can practice spelling of commonly mistaken words, as well as learn foreign languages, names, dates, and facts in flexible <i>Choplifter</i> -type program.†	Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800/1200, 48K (disk); IBM PC (disk); joysticks optional; IBM requires color card.	Defective disks replaced free; backup copy available for \$12.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	E ★ ★	★ ★ ★

RATINGS KEY O Overall performance; D Documentation; EH Error handling; GQ Graphics quality; EU Ease of use; V Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★ Excellent; n/a Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

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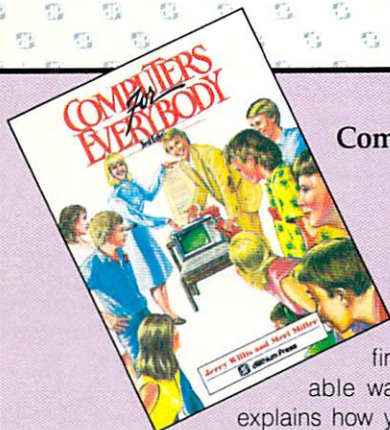
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1900 East Lake Avenue Glenview, Illinois 60025

GAMES									
Title Manufacturer Price	Brief Description	Equipment Required	Backup Policy	Ratings					
O	D	EH	GQ	EU	V				
BLUE MAX Synapse Software 5221 Central Ave. Richmond, CA 94804 (415) 527-7751 \$34.95 ©1983	Pilot a World War I bi-plane over enemy territory. Destroy bridges, tanks, factories, and enemy aircraft. Repair and refuel plane at friendly bases in good game for ages 8+.	Atari 400/800/1200, 16K (cassette), 32K (disk); also available for Commodore 64 (disk or cassette); joystick required.	Defective material replaced free w/ in 90 days; \$5 fee if user-damaged.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	★ ★ ★
CARTELS AND CUTTHROATS 883 Stierlin Rd., Bldg. A-200 Mountain View, CA 94043 (415) 964-1353 \$39.95 ©1981	Buy raw goods, advertise products, manipulate the marketplace, acquire new factories as president of a major corporation in this challenging role-playing game for sophisticated gamers.†	Apple II/IIplus/IIe/III w/ emulator, 48K (disk); paddles optional.	Defective disks replaced free w/ in 30 days; \$10 fee thereafter or if user-damaged; backup copy available for \$10.	★ ★ ★	★ ★ ★	★ ★ ★	n/a	D	★ ★ ★
COMPUTER WAR Thorn EMI 1370 Ave. of the Americas New York, NY 10019 (212) 977-8990 \$39.95 ©1982	Use missile-tracking system to locate and destroy enemy missiles before they locate and destroy your bases and cause a nuclear war. Unremarkable graphics mar otherwise enjoyable game.	Atari 400/800/1200, 16K (cartridge); also available for VIC-20, 5K (cartridge).	Defective cartridges replaced through dealer.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	★ ★ ★
DRIVING DEMON Funware 230 E. Caribbean Dr. Sunnyvale, CA 94089 (408) 745-1655 \$44.95 ©1983	Accelerate and decelerate, steer, downshift, in exciting driving game with above average play system, easily learned and enjoyed by ages 8+.	TI-99/4A (cartridge); joystick required.	Defective cartridges replaced free w/ in 90 days.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	★ ★ ★
GRUDS IN SPACE Sirius Software 10364 Rockingham Dr. Sacramento, CA 95827 (916) 366-1195 \$39.95 ©1983	Transport precious fuel to the remote planet Pluto, in text/graphics adventure game with laughs, frustrations, and animated backgrounds.	Atari 800/1200, 48K (disk); also available for Apple II/II plus/IIe, 48K (disk); Commodore 64 (disk); IBM PC (disk).	Defective or user-damaged disks replaced w/in 90 days; \$5 fee thereafter.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	D	★ ★ ★
KNIGHT OF DIAMONDS Sir-tech Software, Inc. 6 Main St. Ogdensburg, NY 13669 (315) 393-6633 \$34.95 ©1982	Continue adventures with fellow voyagers developed in Wizardry. Many new obstacles, creatures, and treasures to encounter in fine text/adventure game for Wizardry fans.†	Apple II/II plus/IIe/III w/ emulator, 48K (disk).	Defective or user-damaged disks replaced free w/in 30 days; \$5 fee thereafter; backup copy available for \$5.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	★ ★ ★
RENAISSANCE United Microware Industries 3503 Temple Ave., Suite C Pomona, CA 91768 (714) 594-1351 \$34.95 ©1982	Take opponent's pieces to dominate computerized game board in this fast-paced electronic counterpart to ancient strategy game, Reversi. Good for ages 8+.	Commodore 64, (disk or cassette); also available for Atari 400/800/1200, 8K (cassette); VIC-20, 8K (cartridge); joystick required.	Defective disks replaced free w/ in 90 days.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	★ ★ ★
SOCCER Thorn EMI 1370 Ave. of the Americas New York, NY 10019 (212) 977-8990 \$44.95 ©1982	Take on the computer or up to three humans in this stimulating sports simulation featuring clever animation, and fun sounds.†	Atari 400/800/1200, 16K (cartridge); also available for Commodore 64 (cartridge).	Defective cartridges replaced through dealer.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	D	★ ★ ★
SQUISH 'EM Sirius Software 10364 Rockingham Dr., Sacramento, CA 95827 (916) 366-1195 \$39.95 ©1983	Climb skyscraper and retrieve presents while dodging falling debris and squishing attacking creepy monsters in this amusing ladder game.	Commodore 64, (disk or cassette); also available for Atari 400/800/1200, 8K (cassette); VIC-20, 8K (cartridge); joystick required.	Defective material replaced free w/ in 30 days; \$5 fee thereafter or if user-damaged.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	★ ★ ★
WORD CHALLENGE Proximity 3511 N.E. 22nd Ave. Fort Lauderdale, FL 33308 (305) 566-3511 \$39.95 ©1982	Identify words in a box of jumbled letters in this challenging word game enjoyable for ages 10+—especially those uninterested in arcade or adventure games.†	IBM PC (disk); also available for Apple II/II plus/IIe/III w/emulator, 48K (disk).	Defective disks replaced free w/ in 90 days; \$9.50 fee thereafter; user makes backup copy.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	★ ★ ★
RATINGS KEY O Overall performance; D Documentation; EH Error handling; GQ Graphics quality; EU Ease of use; V Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★★ Excellent; n/a Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart									

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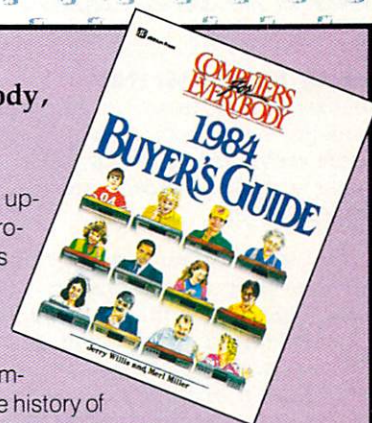
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WHAT'S IN STORE SOFTWARE REVIEWS

On the following pages, you'll find in-depth reviews of some of the programs listed in the Software Guide. Refer back to the Guide on page 134 for information such as backup policies and addresses of software manufacturers.

HOME BUSINESS & HOME MANAGEMENT

Bank Street Writer

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800/1200, 48K (disk)
MANUFACTURER: Broderbund
PRICE: \$69.95

Bank Street Writer is simply one of the best programs of any kind that I have experienced for my Apple II plus. It is more than adequate for the vast majority of tasks for which I would use a word-processing program—correspondence, essays, short documents of any kind.

Its main advantage is the ease with which one can learn to use it. So easy is it, in fact, that many schools have purchased a version marketed by Scholastic specially packaged for classroom use. Between the tutorial disk that accompanies the program and the explicit menus that appear on screen for each of the three operations—ENTRY, EDIT, and TRANSFER—it would be hard for anyone *not* to pick it up within a few short sittings. This, of course, makes it the perfect program on which to teach kids word processing. Functions such as capitalizing letters, moving about bits and pieces of your text, and preparing the text for printing (also known as formatting) are often involved in other, more elaborate word processing programs. They can be rather intimidating to young computer newcomers who are familiarizing themselves with the new machine, as well as the keyboard.

My daughter has resisted learning other word-processing systems, largely because of the amount of time it would take for her to accustom herself to the essentials of a particular program. With *Bank Street Writer*, however, she has tackled the task of learning word processing for school reports and essays. I'm happy she's taken up the computer for practical purposes, although it has created something of a

bottleneck in the line for using the family Apple!

Compared to other word-processing programs (more expensive, and considerably more elaborate), the *Bank Street Writer* does have limitations. Formatting options, though clearly defined and easy enough to understand, are limited. It's difficult, if not impossible, to arrange the text in unusual formats such as tables and charts. Also, editing and erasing are simpler, but much slower, operations on the *Bank Street Writer*, as compared with more expensive, professional programs.

Unless you're in the market for a word processor that demands high performance in those few deficient areas, these flaws are of little significance. Most home writing tasks are easily and elegantly accomplished.

—DAVID WILSON

Mini Jini Record Keeper

HARDWARE REQUIREMENTS: Commodore 64 (cartridge); also available for VIC-20 (cartridge); disk or datassette required for storage
MANUFACTURER: Jini Micro-Systems
PRICE: \$89.95

The best way to describe the *Mini Jini Record Keeper* is as an electronic index card file. The day I received it I realized that here, finally, was a way to set some of my records straight. I write for half a dozen magazines, have contacts at 20 or so software companies, and deal with people in a number of computer companies—I needed more than a name and address file. I needed a cross-reference system to note which companies made programs for which computers, which magazines wanted which articles.

I started entering information right away, with visions of alphabetical listings of editors, articles, systems, and so on, dancing in my head. But the kids needed attention. Next thing I knew, my husband was using *Mini Jini* to store a file of his concert music (he's a school band director). He envisioned information retrieved at the touch of a button: Which pieces were played in the spring of 1978? How many Bach compositions does he have available? With *Mini Jini*, you can set up an "index card," called a record, with up to 10 lines of information (called fields). The computer can search through the cards for all kinds of information and sort it al-

phabetically or numerically (by Zip Code, for instance).

Mini Jini does a little more than just store and sort information. It can also do limited word-processing applications using information from your records. With a printer attached, you can print out mailing labels, or even short letters.

Mini Jini is far from perfect. Its documentation is unnecessarily confusing and its menus could be clearer. A little more attention to detail in writing the menus, and allowing for the use of commas and quotation marks in file information would have resulted in a more polished final program.

In spite of its little flaws, *Mini Jini* is a very reliable method for storing, sorting, and printing out all sorts of information; if you have any organizational needs either for home or small business, *Mini Jini* may prove quite useful.

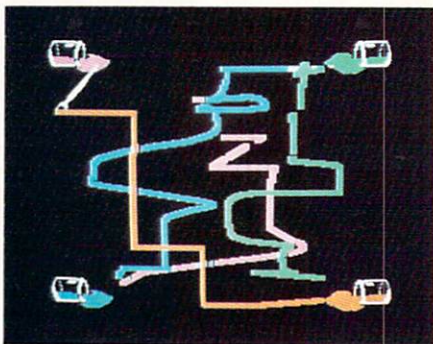
—SHARON AKER

EDUCATION/ FUN LEARNING

Learning with Leeper

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800/1200, 16K (cartridge); Commodore 64 (cartridge); joystick required, color monitor advised
MANUFACTURER: Sierra On-Line
PRICE: \$34.95 (cartridge); \$29.95 (disk)

Green frogs play leapfrog with bugs; caterpillars quietly wander here and there; an animated paintbrush sweeps through the air, leaving a



trail of bright color; a hot-air balloon dips down and catches objects on command—we expect these in a good Disney movie. Now they're available in a fun-learning package called *Learning with Leeper* for

three-to-six-year-olds, which offers four different games, each aimed at improving a different skill. Beginners may start with either a maze game in which a frog hops through a labyrinth (a simplified version of *Pac-Man*) or a painting game in which a brush is dipped into one of four colors and used to paint on the screen. More "sophisticated" players can try a shape-matching game, which includes capital letters for the added benefit of letter-recognition skills. Finally, there is a counting game in which up to five dogs appear on-screen and the child must select a matching number of bones.

Other than the brief written manual intended for parents, everything in the package is nonverbal—from the menu right on through the games. Even very young children can comfortably run this set of games after a brief orientation session. Also, the graphics are delightful: Leeper leaps (as does the frog), a caterpillar crawls, and when you paint, you really move a paintbrush around on the screen (as opposed to simply moving a colored cursor).

Learning with Leeper presents learning experiences in a way that young children can handle with confidence. One young child sat back, fairly oozing confidence and said, "It's nice to know the caterpillar really can't catch and eat the frog . . . can it?"

—TONY MORRIS

Mickey in the Great Outdoors

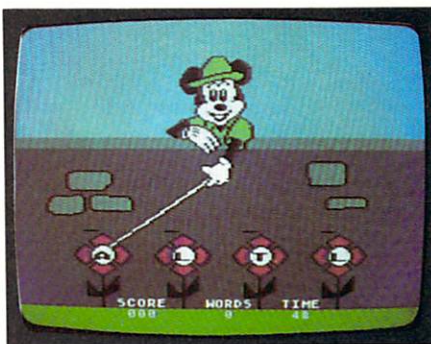
HARDWARE REQUIREMENTS: Atari 400/800/1200, 32K (disk or cassette); 16K (cartridge)

MANUFACTURER: Walt Disney Productions, distributed through Atari
PRICE: \$44.95

Mickey Mouse has made his computer debut in a new fun-learning program titled *Mickey in the Great Outdoors*. Decked out in hiking gear, he's been employed to aid kids, ages seven to 10, drill-and-practice spelling, reading, and math skills.

Mickey in the Great Outdoors is split into two programs—"Hiking" and "Exploring." In the hiking game, a child uses a joystick to shoot down the missing word in a sentence as it floats by among wrong words on clouds overhead. Missing words may be nouns, verbs, adverbs, or adjectives. They come at the start, middle, and end of sentences. To succeed, the child must read the un-

finished sentence, figure out what kind of word is needed, and then shoot it down. After two wrong answers a turtle helps the player out.



The second word game features Mickey as a tutor, standing over a row of scrambled letters. Again with the use of a joystick, the child unscrambles letters to form words. The faster his or her spelling, the faster the pace, and the more points he or she receives.

In the exploring game, kids help Mickey solve math problems by using a butterfly net to "catch" the right answers. Problems get more difficult with each correct answer and there's a mix of addition, subtraction, multiplication, and division.

Easy to use, with superior graphics, *Mickey* is more like a video game than a computer program, and is therefore exceedingly popular among children. The use of the joystick, the speed factor, and the scoring system are all arcade elements that my seven-year-old son, Rory, loves. He plays the game again and again—drilling and practicing language arts and math—all in order to register higher scores.

My only caution would be: Beware of the recommended seven-to-10 age group. With the game, ten-year-olds may tire and grow restless. It's best suited for the seven-to-nine crowd.

Mickey, the old sorcerer's apprentice, is now a computerized playpal.

—BRUCE AND RORY CHADWICK

Rocky's Boots

HARDWARE REQUIREMENTS: Apple II/II plus/Ile, 48K (disk); color TV or monitor recommended

MANUFACTURER: The Learning Company

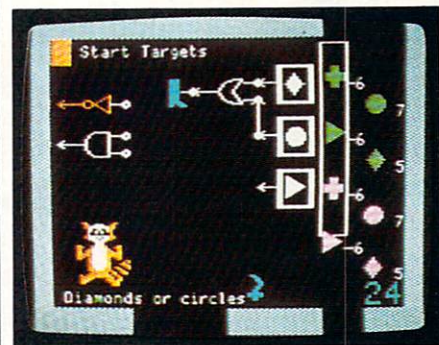
PRICE: \$49.95

Rocky's Boots has nothing to do with footwear. It's a very clever fun-learning package that teaches logic

and simple electronic circuitry.

The object of the activities in *Rocky's Boots* is to combine simple switches, sockets, and mechanisms into more complex circuits that perform logical operations. Some of the components are sensors that emit a signal when touched by a particular colored object. Others are "clackers" that buzz when they receive a signal. Hooking a sensor to a "clacker" causes a buzz whenever an object of the right color touches the corresponding sensor.

After some practice with the basics, you can move on to learn how to use "flip flops," on/off switches, clocks, and delays. Integrating these various mechanisms creates circuits that solve problems as simple as selecting purple objects that pass by in conveyor-belt-like fashion, or as difficult as isolating every third one from a string of blue circles.



If it sounds a bit intimidating, rest assured that *Rocky's Boots'* creators made it simple enough for young children to enjoy and learn from. The program begins with a straightforward menu and then moves step-by-step through more complex stages until you're solving difficult problems and creating your own circuits.

A great deal of the fun of *Rocky's Boots* comes in the early stages of the game, during which you can put together circuits out of the stock of gadgets available. Children as young as eight enjoy tinkering with various parts to "make things happen." This encourages real creativity—a "let's see what happens if" kind of exploratory approach to the world. It requires kids to exercise problem-solving skills: "The clacker goes off sometimes when I don't want it to. What do I have to do to stop that from happening?"

The game is intended for ages seven and up, but most kids younger than 12 or 13 are unlikely to be able

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WHAT'S IN STORE SOFTWARE REVIEWS

to solve the most complex tasks. Nonetheless, they can still have fun with the more elementary problems and tasks.
—TONY MORRIS

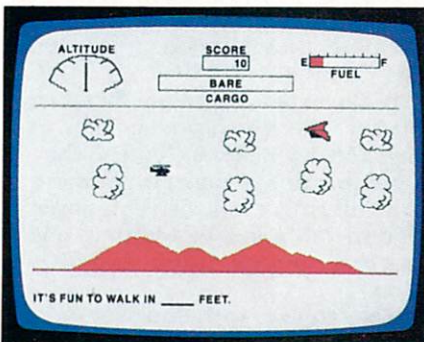
Spellicopter

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800/1200, 48K (disk); IBM PC (disk)

MANUFACTURER: DesignWare
PRICE: \$39.95

Piloting a helicopter over mountains and dodging UFOs while learning vocabulary may sound like an unlikely combination, but DesignWare has put them together in a delightful, entertaining, and educational way in *Spellicopter*.

The package comes with a built-in set of 400 frequently used words



ranging from the simple (*can*, *big*, *ate*) to the nearly impossible (*carburetor*, *synonymous*, *occurrence*, *penicillin*). To begin, you select a list of 10 words (from easy, moderate, and difficult categories). You're given a sentence with one of the words on the list missing. You must pilot your helicopter over mountainous terrain, avoiding balloons, clouds, lightning, trees, and UFOs until you reach a field where the letters of the missing word are scattered on the ground. Hover over each of the letters, pick them up in the proper order to spell the word. Rush back to your home base (again avoiding obstacles) and land: The faster you complete your word-finding mission, the more bonus points you'll earn. Hitting an obstacle, crashing, or misspelling a word all reduce your score by 5 points. Just as the lists of words vary in level of difficulty, the number of obstacles can be varied to provide a challenge for even the most nimble-fingered arcade fanatic!

But there's more. Create your own lists of words and sentences and use these lists to combine learning with

entertainment. Want to practice your French? Put together a list of French words and sentences. Use the sentences to provide clues at first, or have players unscramble the letters without any hints.

On the negative side was a game glitch particularly frustrating to our experienced "arcade pilots": they were charged with collisions when in fact their helicopters were not actually touching any objects. One highly skilled "arcade pilot" became so irritated that he stopped playing the game completely.

In spite of this relatively minor quibble, this package is fun, educational, and, best of all, flexible and expandable.
—TONY MORRIS

GAMES

Cartels and Cutthroats

HARDWARE REQUIREMENTS: Apple II/II plus/IIe/III w/emulator, 48K (disk)
MANUFACTURER: Strategic Simulations
PRICE: \$39.95

As the owner of a manufacturing company, your goal is to reap vast profits from your product, eliminate the competition by clever manipulation of the marketplace, and emerge as the victor in this sophisticated game of finance and enterprise. Using a system of fund allocation similar to the one in Strategic Simulation's *President Elect*, you buy raw materials, manufacture goods, advertise and possibly develop newer and better products to sell, acquire additional factories, secure or pay off loans, and manage labor. By working closely with other manufacturers played by either the computer or mortal opponents, you can form cartels to virtually seal off the marketplace. By intrigue and guile you can fight your way to the top of the economic heap.

A computerized version of Monopoly? Not quite. More like an economic version of the *Road to Gettysburg* or "Diplomacy," requiring all the careful planning and organization of any strategy game. The main problem is that for beginners, such as myself, ignorance of economics is a serious drawback to the immediate enjoyment of the program. (It took a Harvard Business School graduate an hour to explain the rules that I had already spent two hours reading!) But once you manage to master the spreadsheet format of the game,

it can become a challenging intellectual duel for up to six players, as many as five of whom can match wits with the computer.

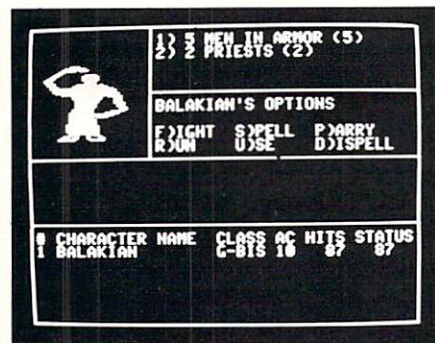
There's a reason this game is one of Strategic Simulations' best-sellers. It's a superb learning tool for the economics student as well as an exciting and fairly realistic example of how the careful combination of planning, money management, and opportunism can produce a successful company. It holds limited interest for many gamers, unless they're the type to struggle through something new—a game that can be sufficiently grasped only after a number of practice rounds. But that's why Strategic Simulations is such an important company in the computer games market. Their programs, whether financial, political, or tactical/historical—even their shoot-'em-ups—allow you to get the most out of your computer.

—JAMES DELSON

Knight of Diamonds

HARDWARE REQUIREMENTS: Apple II/II plus/IIe/III w/emulator, 48K (disk)
MANUFACTURER: Sir-tech Software
PRICE: \$34.95

I've already devoted a number of pages, in this and earlier issues of the magazine, to praising the fantastic role-playing adventure game, *Wizardry*. *Knight of Diamonds* is its first sequel. It uses characters you've created and transferred from the ini-



tial scenario. Now, you must venture once more into the dark and uncharted depths of a multileveled maze, seeking out and encountering monsters galore on your quest to bring enchanted items back to their rightful owners. Traveling with your group of familiar fellow adventurers, you will experience the highs of battles won and magic objects found. If you're lucky, you'll thrill to the discovery of riches and treasures beyond your wildest dreams.

Using the same system of movement, combat, and spell-casting as found in *Wizardry*'s first scenario, *Knight of Diamonds* starts off where the last game ended, with ever-more-treacherous opponents and traps awaiting you as you chart your way through its labyrinthine corridors and darkened hallways. Some doors open into rooms filled with meanies, while others instantly teleport you to another place in the maze. You will encounter stronger monsters or weaker foes able to summon allies to engage you in battle for hours. Spells that would have killed anything that moved in the first game prove useless.

Unlike some other role-playing games, such as the *Apshtai* series (which charts the adventures of only one character), *Wizardry* involves up to six separate voyagers on each sortie into the maze, thereby accommodating large groups of players. And what fun to have a friend join the second game scenario for the first time, when you can send out some of your more experienced characters to "look after" the newcomer until he or she amasses enough points to be properly experienced and self-reliant.

Anyone who has played and enjoyed *Wizardry* would be a "foolish fuzball" not to acquire this scenario and launch into it immediately. Form your own *Wizardry* club and write to me here at FAMILY COMPUTING with tales of adventures and play tips. I'll try to get them into print in my regular Games column.

—JAMES DELSON

Soccer

HARDWARE REQUIREMENTS: Atari 400/800/1200, 16K (cartridge); also available for Commodore 64 (cartridge)
MANUFACTURER: Thorn EMI
PRICE: \$44.95

Here's a clever twist in multiplayer arcade games: Up to four people can work as a team, engaging the computer in a 10-, 45-, or 90-minute soccer match, playable on four different skill levels. Such a variety of play alternatives, including player-versus-player as well as computer-versus-player matches, makes for an evening's worth of entertainment for one person or a roomful of people taking turns at the joysticks. With convincing graphics in which animated players move across a screen/field under joystick control, Soccer ranks as one of the best arcade

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BOOKS

BASIC BOOK BUYING: Picking the Best BASIC Manual for Your Children

BY ED HOORNAERT

"The BASIC manuals for children are in the second aisle from the left," says the bookstore clerk as he turns away to ring up a sale. You find yourself in front of an entire wall of computing books. You groan quietly. All you want is a book to help your kids learn how to program your new computer—a book that will give them a taste of what it's all about without shoving it down their throats. How can you possibly make the right choice from the slew of children's programming manuals that you see on the third shelf from the bottom?

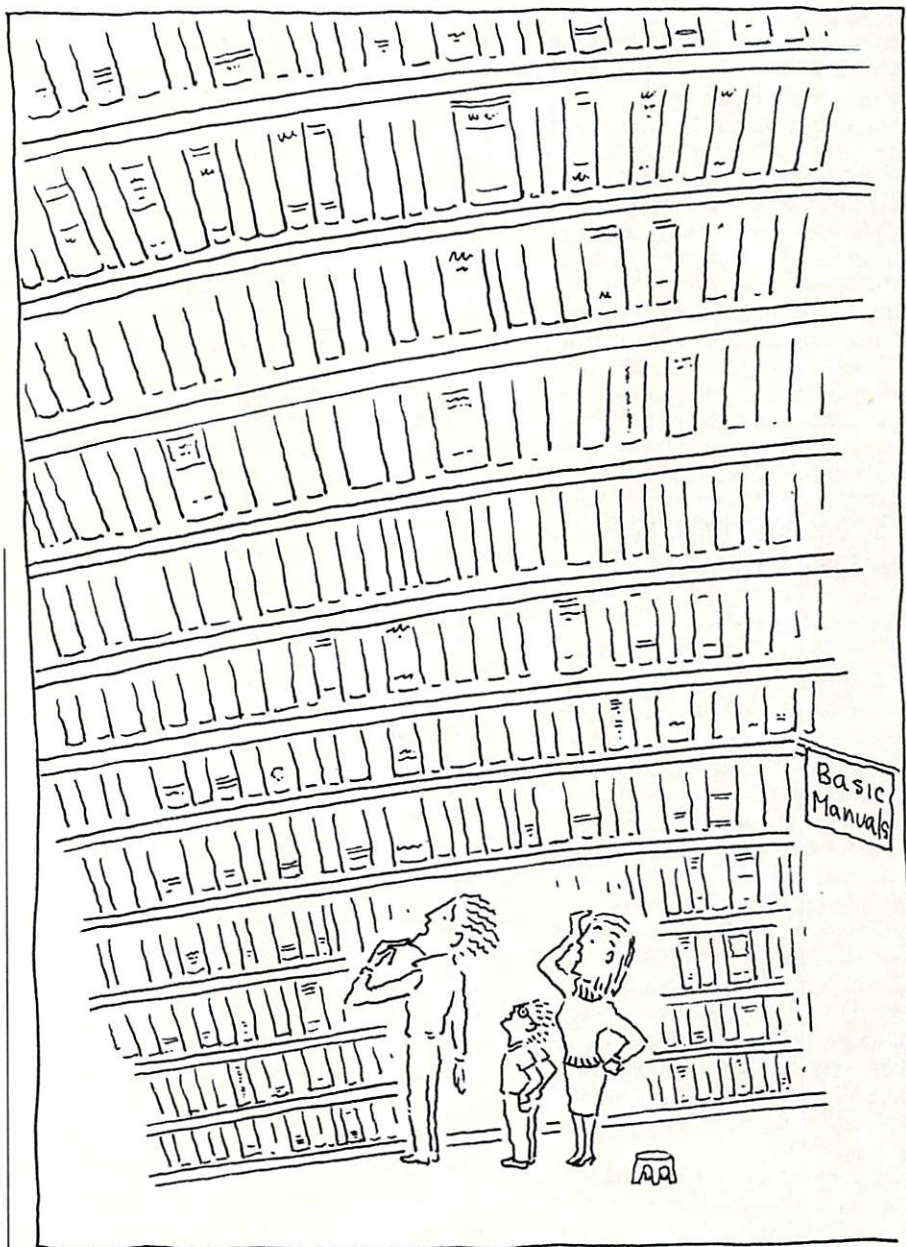
You glance back at the clerk, but realize that he probably knows less about computers than you do.

You're on your own.

MATCH THE BOOK WITH THE BRAND

First off, you can start by eliminating all the books on the shelf except those that are written specifically for your computer. Each machine has its idiosyncracies, which are reflected in the version of the BASIC language it uses. Commands for creating sound and pictures, for example, are different on each computer. And

ED HOORNAERT teaches elementary school and runs the school's computer club in Clearwater, British Columbia. His book, *A Kid's Manual for Programming the Sinclair/Time Computers*, was published by TAB Books last fall.



even if you know how to translate the book to fit your computer, your children won't. A "general" book deprives your child of the exhilaration of producing your computer's most exciting effects and exploiting the potential of your particular computer. With few exceptions, your best bet is to stick to books written for your machine.

If you own any but the most popu-

lar computers, though, you will have trouble finding a children's programming book. You'll have to choose a general guide for young people. Often the books that aren't intended for instruction on a certain machine specify (usually somewhere in the preface, on the back cover, or in an appendix) a list of the computers with which they can be used.

Next, consider your children's in-

BOOKS

terest in computers. How deep a knowledge of programming do you want them to have? How much do they seem to want to learn? It is neither necessary nor desirable for children to learn every BASIC command, and authors have selected widely varying numbers of commands to teach. Will your children's infatuation with computers sustain them through a longer, more thorough manual, or would a short introduction be closer to what they need?

The length of the book will sometimes give you a clue as to its comprehensiveness. Some are quite short and cover fewer BASIC commands. Be sure to compare the commands listed in the table of contents. Even if you aren't familiar with all the BASIC that is listed, this will give you an idea of how much the book attempts to teach. Pay attention to the thoroughness of each book. While some introductions are, quite simply, a case of overkill, others are totally insufficient to the task

of acquainting kids with the feel of BASIC programming.

If you've brought your children along, get them to read a paragraph or two. Can they read the book easily? If you're on your own, check the back cover or the introduction—somewhere, publishers print the age of the target audience. You will find that some books are written for children as young as eight, while others are for older children, 12 to 14. Although there are a few exceptions to this rule, it's a good idea to beware of books that claim to be introductions to "kids from four to 40." Can you imagine having much patience with a book that would teach a four-year-old how to play the piano? By the same token, do you think your four-year-old would take to piano lessons suitable for someone your age?

A LOT OF TYPING, A LOT OF DUST

Leaf quickly through the remaining manuals to see which one seems

to be the most enjoyable. Do the lessons seem appealing? Remember, examples in which your child is asked to draw simple pictures are more engrossing introductions to computers and programming than, say, math programs.

Also, is there a touch of humor in the text? Is it broken up with informative illustrations? Games or thought-provoking puzzles provide a welcome change of pace. Of course, remember that a lot of pretty pictures don't automatically make an ideal beginning book on BASIC. But it's safe to say that your children will find programming a good deal more inviting if they don't fall asleep over the text.

Check how much typing is involved. Your kids may be enthusiastic about computers, but if they don't know a thing about typing, they'll be meeting the keyboard, as well as BASIC, for the first time. Imagine the poor child who will take nothing less than one minute and

BASIC MANUALS FOR CHILDREN

Here are brief descriptions of some of the BASIC manuals I recommend for children:

Computers for Kids, by Sally Greenwood Larsen (Creative Computing Press); ages eight and up; softcover, \$5.95.

Editions available for Apple II, IBM PC, Timex Sinclair 1000, TRS-80, Atari, and VIC-20 (which is also suitable for Commodore 64).

FEATURES: A quick introduction to the major BASIC commands; background rules for safe computer use; a section for teachers and parents.

Computer Programming for Kids and Other Beginners, by Royal Van Horn (Sterling Swift); ages eight and up; 144 pages, softcover, \$9.95.

Editions available for IBM PC, TRS-80 Models I/III and Color Computer, and Apple.

FEATURES: Large, easy-to-read print—aimed especially at the young programmer; extensive background sections for parents; very careful development of variables.

Kids and the Apple, by Edward H. Carlson (Datamost); ages 10 to 14; 227 pages, softcover, \$19.95.

Editions also available for VIC-20, Commodore 64, Atari, and Texas Instruments 99/4A.

FEATURES: Excellent illustrations;

helpful "Instructor Notes" for each lesson; later chapters suitable mostly for 12 years or older; thorough introduction to BASIC.

A Kid's Manual for Programming the Sinclair/Timex Computers, by Ed Hoornaert (Tab Books); ages eight and up; 168 pages, softcover, \$6.95; hardcover, \$12.95.

FEATURES: Introduction to most BASIC commands.

TRS-80 for Kids from 8 to 80, by Michael Zabinski (Howard Sams); ages 10 and up (unless the kid is a great reader); 130 pages, softcover, \$9.95.

FEATURES: Excellent illustrations; write-in workbook format; game activities such as crosswords, and word searches.

The following books are not written for a specific machine. They're included because of their unique approaches to computer programming instruction.

BASIC Beginnings, by Susan Drake Lipscomb and Margaret Ann Zuanich (Avon/Camelot Books); second grade readers; 95 pages, softcover, \$2.25.

Written in a so-called standard version of BASIC, with notes at the back for translation to TRS-80, TI,

Osborn, IBM PC, Hewlett Packard-2000, Apple, Atari, and Altair.

FEATURES: A series of short programs to be explained by the parent working along with the child; suggestions for adding to programs.

BASICally Speaking, by Frances Lieberman Cohen (Reston); ages eight and up (according to the book, although 10 and up seems more like it, unless the kid is a crackerjack reader); 129 pages, \$12.95; hardcover, \$16.95.

Programs will run on TRS-80 Models I/III, PET, Apple II, and Atari.

FEATURES: Extensive background on computer history; the parts of a computer and computer languages; fairly comprehensive coverage of available BASIC commands.

Computer Battlegames and Computer Space Games, by Daniel Isaamen and Jenny Tyler (Usborne); ages nine and up; 48 pages, softcover, \$5.95; hardcover, \$8.95.

Programs for Timex Sinclair 1000, with very well-marked translations for Timex Sinclair 2000, BBC, TRS-80, Apple, and VIC-20.

FEATURES: Superb illustrations; fairly short game programs, with explanations of each program and suggestions for improving programs; (not really a BASIC manual, but good instructional material).

BOOKS

12 seconds to peck the word PRINT. If a book involves huge amounts of typing, it will either gather equally huge amounts of dust or you'll end up doing most of the typing yourself.

OTHER VARIABLES OF BOOK BUYING

If there's anything more off-putting than typing for kids (much less adults), it's the concept of the variable, used in such programming commands as FOR...NEXT loops, and IF...THEN statements. The notion embodied in the FOR...NEXT loop is that the computer will jump to another predesignated part of the program, depending on the value of the input variable. This is quite sophisticated, for nonprogrammers of any age. Open the book to the chapter on FOR...NEXT loops. How carefully are variables presented? They should be introduced gradually, moving from simple to more complex examples. How do texts stack up relative to each other? Older children have fewer problems with FOR...NEXT loops than with IF...THEN statements (an instruction that tells the computer to make a decision based on a formula input by you or your child). Compare them the same way you would a FOR...NEXT loop. Be sure that initial examples are simply and clearly explained.

Basically, that's all there is to choosing the proper book for your children. By now you have one book in your hand—the (more or less) ideal introduction that will teach BASIC to your kids and open up a brand new world for them. ☐

BASIC BOOKSELLERS:

Avon Books, 959 Eighth Ave., New York, NY 10019; (212) 399-4500;

Creative Computing Press, P.O. Box 789 M, Morristown, NJ 07960; (201) 540-0445; **Datamost**, Reston Publishing Company, 11480 Sunset Hills Rd., Reston, VA 22090; (703) 437-8900; **Reston Publishing Company**, 11480 Sunset Hills Rd., Reston, VA 22090; (703) 437-8900; **Howard W. Sams and Co.**, 4300 W. 62nd St., Indianapolis, IN 46206; (317) 298-5400; **Sterling Swift Publishing Co.**, 1600 Fortview Rd., Austin, TX 78704; (512) 282-6840;

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THE PRIMER

The Primer will appear in every issue of FAMILY COMPUTING. You might look to it for "Everything You Always Wanted to Know About Computers but Were Afraid to Ask." New information will be presented periodically, and existing sections will continually be adapted and updated. Whatever the format, the Primer is a handy reference guide to shopping for, setting up, and using a computer.

The only way to learn to use a computer is to use one. But before you start, it's well worth asking, "What can I do with a computer?" And, "How does a computer work?"

The illustration of a computer system on the opposite page shows various pieces of equipment, referred to as hardware. To work effectively, this hardware needs step-by-step instructions, or programs. These programs are often called software. What you can do with a computer depends on the software you use.

The many uses of home computers can be broken down into several broad categories.

WHAT A COMPUTER DOES

Game Playing. Several types of games are available—arcade-style action, fantasy, adventure. Some take minutes to master; others months. Many games can be played by more than one person at a time.

Education. Whether you are learning math, French, history, or typing, these programs allow you to learn at your own pace. Programs range from question-and-answer drills to loose creative exercises. Some test logical skills, by putting you in a real-life problem-solving situation; others teach you to program by letting you draw pictures.

Paper work. When it comes to handling reams of information, the computer can't be beat. It functions as an endless supply of paper, file cabinets, and a calculator rolled into one. With an electronic spreadsheet, you can change one figure in a budget and the rest will automatically change. The ability to ask "what if?" and see immediate results has obvious time-saving benefits.

The computer is equally adept at setting up a filing system, and allows you to cross-reference data in any number of ways for easy recall.

With a word-processing program, the computer can speed up and simplify the writing process, by allowing

you to change or rearrange words and paragraphs without retyping.

Information access. You can hook your home computer, via the telephone, to much larger computers at "information service" companies. This allows you to "call up" stock quotations, airline schedules, newspaper and magazine bibliographies, encyclopedias, and even games.

Also, by using the telephone lines you can hook your computer to other home computers around the country, and leave or receive messages. This practice is known as electronic mail. Several computers linked together are called a network.

Programming. It's possible to enjoy practical benefits from your computer without ever buying a commercial program—you can write your own. And, in some cases, you can adapt commercial programs to better suit your particular needs.

HOW A COMPUTER WORKS

The computer is an information-handling machine. It stores, compares, changes, and manipulates information of almost any kind at tremendously high speeds.

The computer's operating method can be boiled down to four simple steps. (1) **INPUT:** Instructions and information, in the form of a program and data, are entered into the computer. (2) **PROCESSING:** The computer executes the steps of the program. (3) **OUTPUT:** The results of the computer's work are made visible and available to the user. (4) **STORAGE:** Results can be stored and saved.

Most home computers do not come ready-made in one piece, but must be assembled from various components. Following are the components needed for each of the four operating steps, and how they work.

Input. There are four basic ways of getting a program and/or other information into a home computer.

KEYBOARD. The keyboard looks and behaves much like that of a type-

writer. Some keyboards have special keys for certain computer functions, and some have a numeric keypad, much like a calculator. But on any unit, every keystroke you type goes directly into the computer's memory. That information will stay there until you delete it or turn the computer off. (You can also store, or save, that information for future use.)

CASSETTE TAPE RECORDER. You can copy a program stored on a cassette tape directly into the computer's memory. Regular tape recorders and cassettes can be used with most home computers, although you will need a special cable to connect the two. Once connected, you merely type a simple command to transfer the program from tape to computer.

DISK DRIVE. The transfer method is much the same with a disk drive, except that the program is stored on a floppy disk, which looks much like a 45 rpm record.

The disk drive enters programs much more quickly and with less chance of error than the cassette recorder. But the cassette recorder is significantly cheaper.

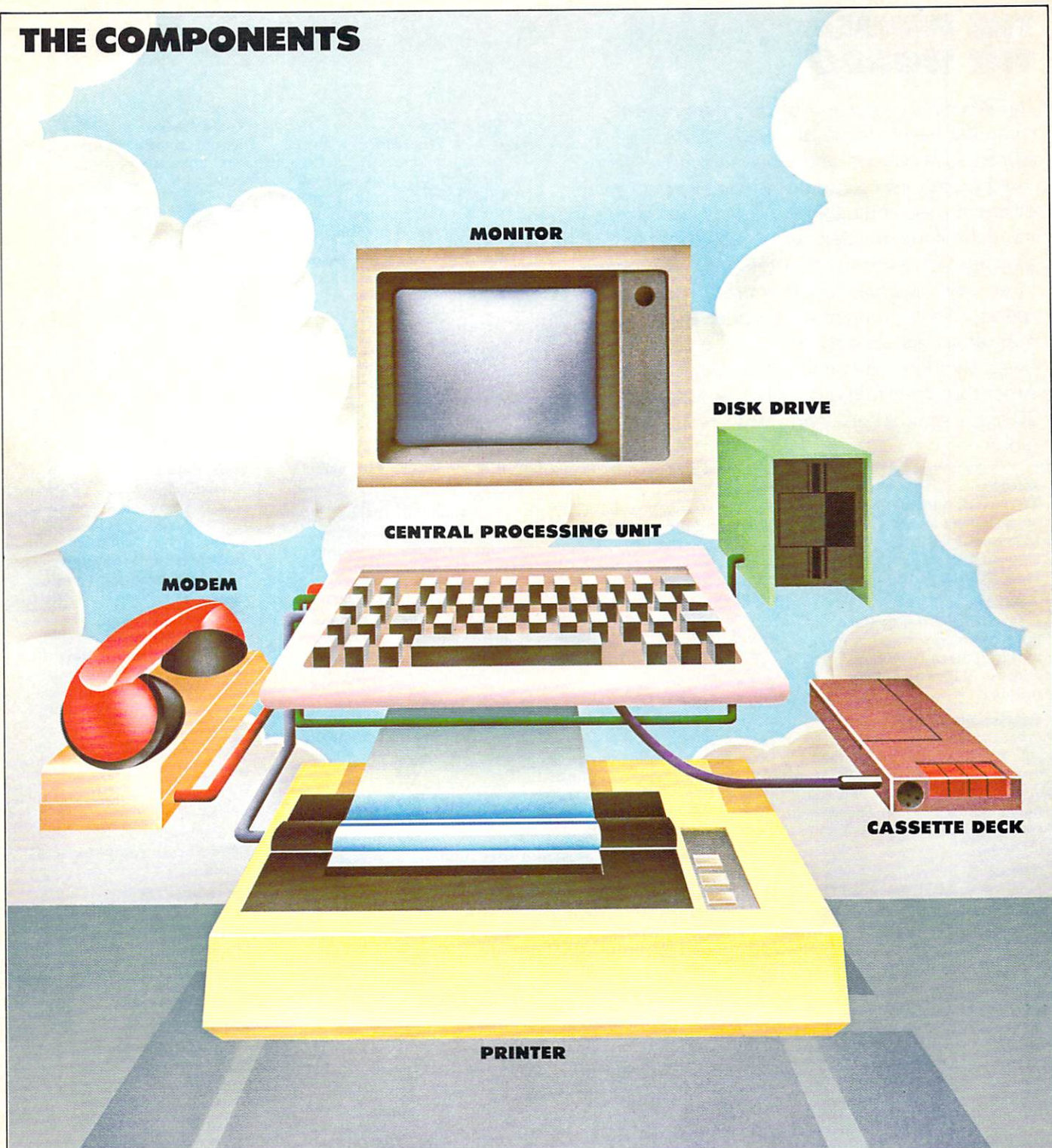
CARTRIDGE. A cartridge, which plugs into a slot built into some computers, also stores programs. Putting a cartridge into a computer actually adds memory to the computer—and that memory contains a program.

Processing. All input goes to the Central Processing Unit (CPU), located underneath the keyboard. The CPU is a maze of tiny electronic circuits, but it functions as a giant.

The CPU controls the flow of information into, out of, and inside the computer. The computer's memory, where information is stored, is located in the CPU. The CPU also interprets a program, performs each of its steps, and then sends the results to the user.

Output. The visible result of a CPU's work is called output. Output is made available on the screen of a

THE COMPONENTS



TV or monitor, or from a printer.

Computers can be hooked to TVs or monitors, and to printers. In all cases special cables are required. In general, the monitor's screen display is sharper than the TV's.

Storage. When the computer is turned on, it will store and remember all information it receives. But when it is turned off, this information will vanish—unless you instruct the computer to save it.

You can store information on a blank tape or disk. Either way, you

can record the results of the computer's work, just as you would record a speech. Then, any time you want to run that program again, you can transfer it into the computer's memory, and see it on the display screen.

You cannot store new information on a cartridge.

Peripherals. Peripherals are optional pieces of equipment that can be added to your computer, but are not crucial to the computer's operation. A printer, in fact, is considered

a peripheral. One of the most popular peripherals is a modem.

MODEM. If you want to link your computer to an information service or other computers, you will need a modem. A modem holds a telephone receiver and transmits and receives data through phone lines.

Remember that the computer is a tool. As with all tools and machines, there is no need to know everything about how a computer works. All you need to know is how to use it for your own purposes.

THE PRIMER THE WORDS

The Words is a glossary of commonly used computer terms. Some are well-known English words, such as *read* and *write*, that have been incorporated into computer language and given different meanings. (Note: All italicized words in the definitions are defined in full elsewhere in the glossary.) Other terms that refer to a computer's inner workings are not often used in common speech, but are important because they are used in manufacturers' specifications and ads. Don't be awed by them. Remember the delight with which Americans took to the new NASA language over 20 years ago, when John Glenn first orbited the globe.

Access

To retrieve information from a storage place in the computer system. Access time is the amount of time it takes to obtain the information.

Address

A specific location in the computer's *memory* where a piece of information is stored. Each address is identified by a number.

Applications software

Programs that instruct the computer to perform one task or a group of related tasks, such as keeping track of a household budget, or the accounting and inventory of a business.

BASIC

Beginner's All-purpose Symbolic Instruction Code. A popular, easy-to-learn *programming language* widely used with *microcomputers*.

Baud

Bits per second. A unit of measurement that describes the rate at which *data* are transmitted from one device to another, such as computer to *printer*, computer to computer, or computer to *terminal*.

Binary code

A number system using only two digits, "0" and "1." Any number or letter can be expressed as a combination of these digits. Computers use the system by translating each *character* of information into a string of binary numbers.

Bit

The smallest unit of information a computer uses. A bit is either the digit "0" or "1." An "eight bit" processor manipulates *data* in clusters of eight bits.

Board

Printed circuit board. A flat, thin rectangular component of a computer that includes one or more layers of printed circuitry and to which *chips* and other electronic parts are attached. As an add-on to an existing computer, sometimes called a card.

Boot

Derived from "bootstrap." To start or restart a computer system by *reading* instructions from a storage device into the computer's *memory*.

Bug

An error in the logic of a computer *program* that prevents it from running properly. Bugs can cause a program to "freeze up," that is, to repeat the same operation endlessly. Finding and correcting the error is called debugging.

Bus

A device that connects components of a computer so that *data* can flow between them. There are several conventional buses that allow components made by different manufacturers to be used in the same computer.

Byte

One byte contains eight *bits*, enough to stand for one *character* of English, or one number. Thus, it generally takes more than one byte to make up a word. "Cat," for instance, requires three bytes.

CAI

Computer Assisted Instruction. A term applied to a wide range of instructional *software*, including drill-and-practice, simulation, and educational games.

Cartridge

A device that stores a prerecorded *program*. A cartridge is inserted into a special slot built into the computer. Also known as a solid state cartridge or ROM module.

Cassette tape recorder

Computer cassette recorders are usually the same as those used for audio recordings, but often need a special cable to connect them to the computer. They house and run magnetic tapes that either hold a prerecorded *program* or store *data* from the computer.

Character

A letter, number, or symbol.

Chip

A small (about the size of a child's fingernail) component that contains a large amount of electronic circuitry. Chips are the building blocks of a computer and perform various functions, such as doing arithmetic, serving as the computer's *memory*, or controlling other chips.

Command

An instruction that tells the computer to do something, such as to run a *program*.

Compatibility

The ability of different devices, such as a computer and a *printer*, to work together; or the ability of a particular *program* to run on a given computer. In short, the ability of anything in a computer system to work with anything else.

CP/M

Control Program for Microprocessors. A widely used *operating system* for microcomputers.

CPU

Central Processing Unit. The "heart" of a *microprocessor*, with components that control the interpretation and execution of instructions.

CRT

Cathode Ray Tube. A TV or TV-like *monitor* used to display information and pictures. Also called a computer screen.

Cursor

A symbol, usually a small square, that indicates where the next *character* will appear on the CRT screen.

Data

Information put into or taken out of a computer.

Data bank

A central location for storing vast amounts of information accessible by computer.

Data-base manager

A *program* that allows the user to enter, organize, sort, and retrieve information.

Disk

A magnetic device for storing information and *programs* accessible by a computer. A disk can be either a rigid platter (hard disk) or a sheet of flexible plastic (floppy diskette). Disks have tracks, much like grooves on LP records, where *data* is stored.

Disk drive

A device that *reads* information from a *disk* and copies it into the computer's *memory* so that it can be used by the computer, and that *writes* information from the computer's *memory* onto a *disk* so that it can be stored.

Documentation

The written instructions that explain how to use computer *hardware* or *software*. Also refers to all instructions and remarks, used to describe procedures when programming.

DOS

Disk Operating System. See *operating system*.

Downtime

Time when a computer is not working.

Electronic mail

The transmission of messages, documents, or other information from one computer user to another. This can be done over telephone lines using devices called *modems*.

Emulator

A *hardware/software* device designed to translate *programs* written for one particular computer so that they will run on another computer.

Firmware

Programs or *data* stored in ROM—either built-in by the manufacturer, or added with a cartridge—that cannot be changed by the user.

Flow chart

A diagram on paper that shows all the logical steps necessary to write a *program*.

Format

To prepare a *disk* so that it can receive and store information. Until you perform this task, the *disk* will not be able

THE PRIMER

THE WORDS

to store any information. The word "initialize" is often used to mean the same thing as format.

Function key

A special key on the computer's keyboard that has been or can be designated to perform a specific task.

Graphics

Pictorial displays on the CRT, such as charts, graphs, and symbols. Contrasted with *text*.

Graphics tablet

A kind of electronic drawing board. With a graphics tablet and a special pen, whatever you draw will appear simultaneously on the CRT.

Hard copy

Information printed by the computer onto paper.

Hardware

The physical, nonchanging parts of a computer system. Contrasted with *software*, or programs, which can change.

High-level language

A programming language that resembles an ordinary spoken language (e.g., English). BASIC is a high-level language.

Input

Programs or data entered into the computer.

Interface

An electronic connector between the computer and its peripherals.

K

Abbreviation for kilo, or 1,000. When used to describe the amount of *memory*, or storage space, a computer has, it often signifies 1,024. A computer with 16K bytes of *memory*, for example, can store 16,384 characters of information.

Keyboard

Designed much like that of a standard typewriter, the keyboard is used to enter information into the computer.

Load

To enter a program from an external storage device into the computer.

Information services

Broad-based data bases that offer a variety of services, ranging from airline reservation information to stock market quotations. You need a *modem* to link up with such a service.

LOGO

A programming language that allows the user to draw pictures on the screen. LOGO is particularly good for teaching young children how to program.

Loop

A statement in a program that instructs the computer to repeat a certain task.

Machine language

A binary code consisting of "0s" and "1s," which is the only language a computer understands. Programs written in any other language, such as BASIC, are translated into machine language for processing.

Membrane

A type of computer keyboard with a flat, smooth surface.

Memory

The place in a computer where data and programs are stored.

Menu

A list on a CRT of the operational options of a computer program; a list of programs stored on a tape or disk.

Microcomputer

A small computer designed primarily for home or small business use. The micro can do today what many room-sized mainframe computers did 20 years ago.

Microprocessor

A tiny processor on a single chip. The "brains" of all microcomputers, it is also found in many consumer and industrial products.

Modem

A contraction of Modulator/Demodulator. A device that makes it possible to transmit and receive computer data over telephone lines.

Monitor

A device for visually displaying a computer program or the results of that program on a screen. See CRT.

Network

A system of linking computers so that users can share resources and exchange information.

Operating system

A program that controls the operation of a computer system, such as controlling signals to the disk drive or printer. When a computer system is turned on, the operating system is the first program executed. All subsequent pro-

grams are loaded and supervised by the operating system.

Output

Computer-generated information that is transferred to a monitor, disk, tape, or printer.

PASCAL

A programming language that can be used on many microcomputers. While it is considered more difficult to learn than BASIC, it can generate programs that run faster and use less memory.

Peripherals

Hardware accessories for a computer, such as a disk drive, printer, or modem.

Pixel

Stands for "picture element." A single dot of light on a TV screen or computer monitor. These tiny elements are used to create electronic pictures, or graphics.

Plotter

A machine, attached to a computer, that prints lines or graphs on paper.

Printer

A machine that transfers information stored in the computer onto paper. Two of the most commonly used printers are: dot matrix—a printer that forms text or graphics using a group of individual points (dots); and letter quality—a printer that prints fully formed characters (like a typewriter), using a type element called a "daisy wheel."

Program

A set of step-by-step instructions that tells a computer how to solve a given problem. Also, to prepare such a set of instructions.

Programming language

A language, with clearly defined rules, that can be used to express a computer program.

RAM

Random Access Memory. An area in the computer where information is stored. When called into this area, information can be read, changed, or edited. However, it will be lost when the computer's power is turned off, unless you first save the information.

Read

The process of copying information from a storage device (such as floppy disk or tape) into the computer's memory.

Reading only copies; it does not erase the data from where it is stored.

Resolution

The sharpness of a picture on a CRT, usually described as "high" or "low." The higher the resolution, the sharper the picture. Resolution is expressed by the number of pixels in the display. For example, 560x720 is much sharper than 275x400.

ROM

Read Only Memory. Permanent memory built into a computer by a manufacturer. The information stored here gives the computer operating instructions when it is first turned on. The user cannot change this memory, but "only read" it.

Save

To store information from memory on tape or disk so that it can be used again.

Software

Computer programs. Also, tapes and disks.

Stringy floppy

A computer storage device that holds a magnetic tape, called a wafer. The enclosed wafer tape is thinner, narrower, and faster than conventional cassette tapes.

Terminal

A computer user's workstation. Also refers to the computer screen where information is displayed.

Text

Words, letters, and numbers that appear on a CRT. Contrasted with *graphics*, which are lines, shapes, and symbols.

Winchester

A type of hard disk that is sealed in an air-tight, dust-free container. See disk.

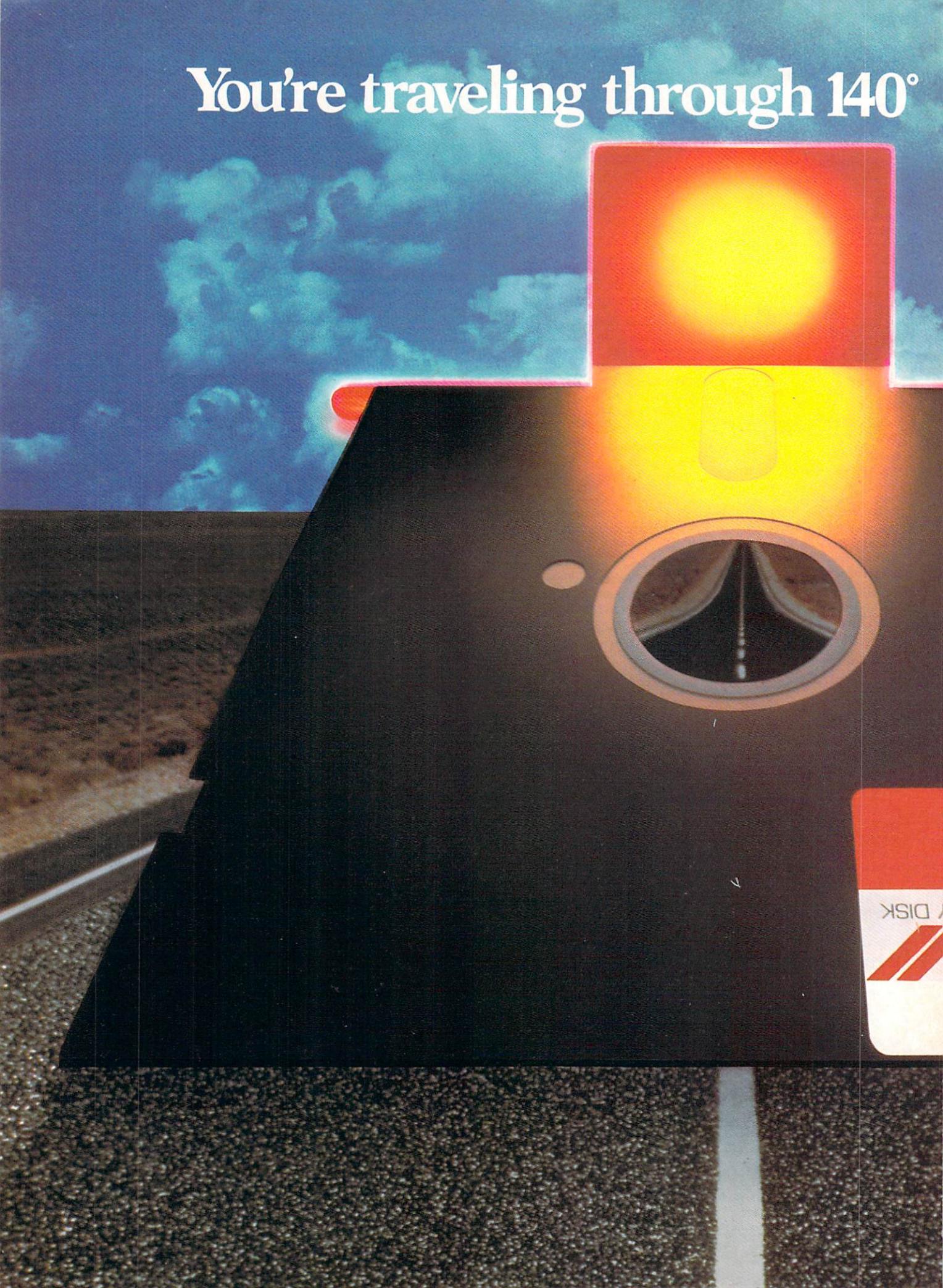
Word processor

A program that allows the user to write, edit, or rewrite text. The text can be saved on a storage device and printed out. A word processor allows the user to make changes in the same text without retyping the whole page.

Write

The opposite of read. To transfer information from the computer's memory to a storage device such as a floppy disk. Write-protect is a procedure for preventing a disk from being written to.

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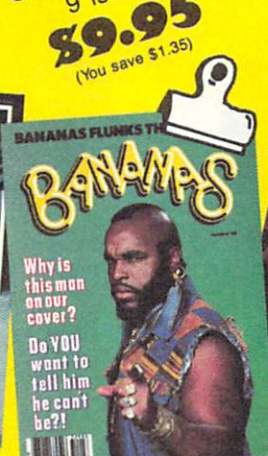
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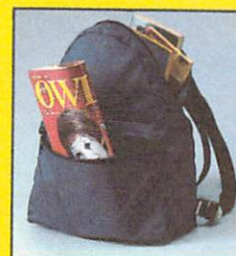
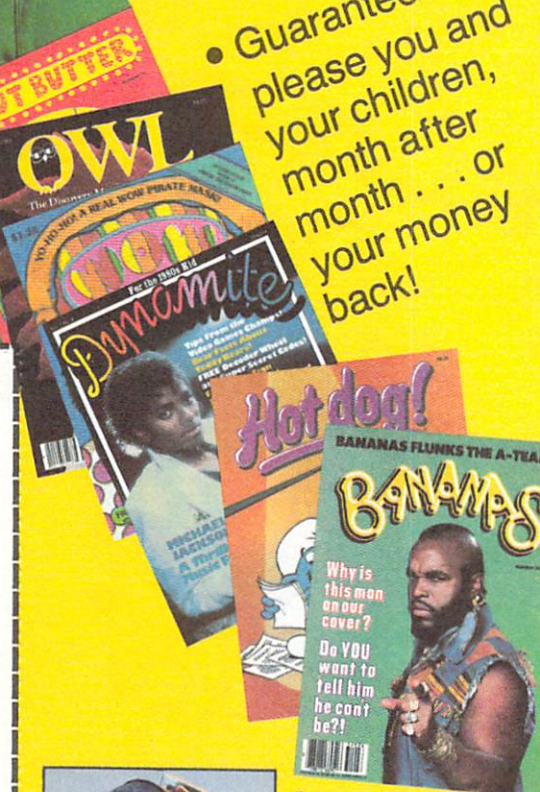
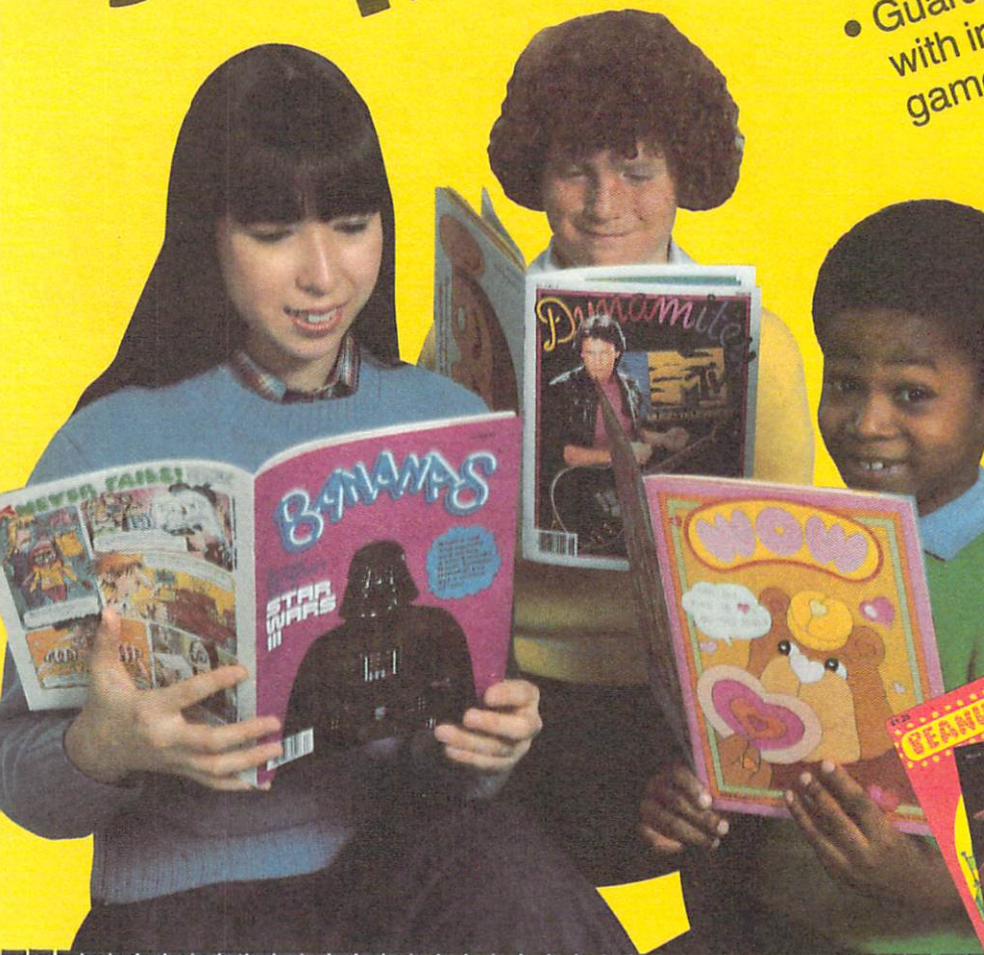
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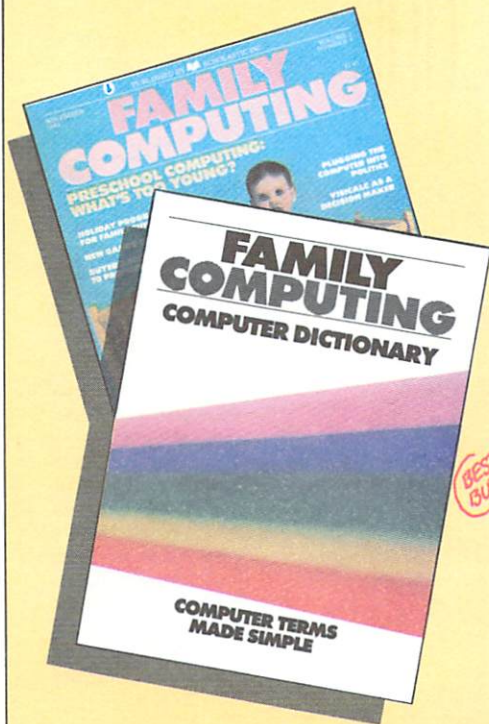
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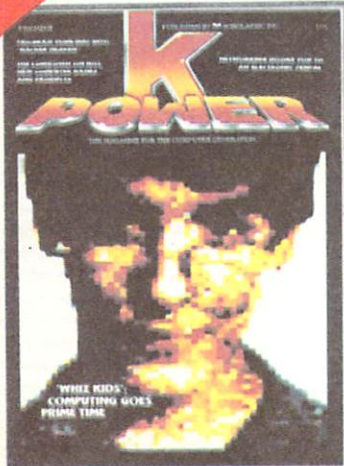
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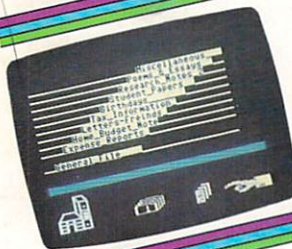
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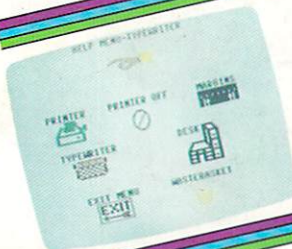
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